

TROPICAL DISEASES BULLETIN

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SUMMARY OF RECENT ABSTRACTS*

II. YELLOW FEVER

General

The Report of the first session of the Yellow Fever Panel, W.H.O. (p. 30), is concerned with delineation of endemic areas in America and Africa, details of which should be sought in the original. Recommendations are made for international control of the disease, and these follow the usual lines.

Ross (p. 802) points out that when mosquitoes which may be infected with yellow fever virus are transported for long distances, they may be dangerous if fully active, and many of them may die. He shows that at 26°–30°C. the virus in dead mosquitoes may survive for 72 hours; in mosquitoes kept at 1.1° to 4.4°C., at which temperature they are immobilized, the virus may survive for 32 days or more.

Epidemiology, Reservoirs, Transmission

Protection tests in children born since a mass campaign of immunization was carried out in 1941 indicate that yellow fever infection is continuously being introduced into the human population of Bwamba county, Uganda, presumably from reservoirs in the forest zone. Some 61 per cent. of the forest monkeys are immune, and DICK (p. 802) thinks that there may be an undiscovered reservoir. Ross and GILLET (p. 627) have reproduced in the laboratory, with the monkey *Cercopithecus aethiops centralis* and *Aedes africanus*, the cycle which is believed to occur in the extensive forests of Bwamba, Uganda. In small isolated forests, on the other hand, this cycle seems inadequate to maintain the virus because there might be insufficient mosquitoes or insufficient non-immune monkeys.

In an experiment with *Aedes africanus*, GILLET *et al.* (p. 627) failed to find any evidence that yellow fever virus is transmitted by infected females to their eggs, and they conclude that this probably never occurs.

Aedes simpsoni may be found at ground level and in the forest canopy at 50–60 feet, in the rain forest area in Bwamba county, Uganda. HADDOW (p. 455) shows that it is the dominant mosquito of banana plantations, and thinks that it may become infected with yellow fever on infrequent visits to the canopy, where it may feed on monkeys.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1951, v. 48. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

In relation to the epizootology of yellow fever in the Semliki Forest, Uganda, LUMSDEN (p. 981) has studied the night-resting habits of monkeys in the trees. Details should be sought in the original. BUXTON (p. 981) shows that the same individual trees are used time after time by some of the monkeys.

LUMSDEN and BUXTON (p. 1102) have studied an area of the West Nile District, Uganda, in which there is a pronounced dry season, and where, presumably, transmission of jungle yellow fever is not so easy as in the equatorial forest in Bwamba where adult *Aedes africanus* are always present. They show that some of the people, and some of the monkeys captured, are immune to yellow fever. Several species of proved vectors were captured, and most probably *Aedes africanus* and *Aedes luteocephalus* are the active vectors in the monkey population. Mosquitoes which habitually breed in small containers, which include all the proved African vectors, are reduced, towards the end of the dry season, to at most a very small adult population biting man in the forest.

A list of mosquitoes in Ethiopia drawn up by GIAQUINTO-MIRA (p. 677) contains information on species of *Aedes* capable of transmitting yellow fever.

In part of N. Rhodesia protection tests have been found positive in 7 per cent. of blood samples. ROBINSON (p. 143) has made studies on the mosquitoes there, which show that species which are proved vectors of yellow fever are only a small minority of those which attack man at ground level, in spite of their presence in considerable numbers in collections of larvae. There is evidence that some of the tree-hole breeders survive the dry season as adults; it remains to be seen if they can maintain the virus in a non-human transmission cycle.

A series of cases of jungle yellow fever in Panama is reported by HERRERA *et al.* (pp. 730, 801). The outbreak occurred in 1948-49; in several cases the diagnosis was confirmed histologically.

Transmission of yellow fever to man in Panama is probably effected by *Haemagogus spegazzinii falco* and *Aedes leucocelaenus*. GALINDO *et al.* (p. 144) also suspect *Sabethes chloropterus*, but there is no proof. In relation to this outbreak the same authors (p. 802) have made an extensive study of the forest mosquitoes of the area, collecting them at different heights from the ground. A number of genera were represented, including *Haemagogus*, *Aedes* and *Sabethes*, to the last of which the authors draw attention, though they did not carry out tests of vector capacity.

KUMM and LAEMMERT (p. 455) have found specific neutralizing antibodies in sera from monkeys and marmosets throughout most of Brazil. They give much detail in the original paper. HUGHES and PERLOWAGORA (p. 547) show that in forest animals of Brazil infected with the yellow fever virus by the bite of *Aedes aegypti* there is great diversity in response. In some there is no viraemia, and no neutralizing antibodies develop; in others viraemia sometimes occurs, and neutralizing antibodies, if they develop, may be transient. Complement-fixing antibodies may be a better proof of infection than neutralizing antibodies, but in one animal with abundant viraemia and transient neutralizing antibodies there were no complement-fixing antibodies.

LAEMMERT and KUMM (p. 456) show that two species of Brazilian howler monkeys, in addition to *Alouatta seniculus*, can be infected with the yellow fever virus by the bite of the infected mosquitoes; they may be important reservoirs of the disease. *Aedes scapularis* is capable of transmission, though it has not been found infected in nature, and it may be important in the survival of virus in the winter months. KUMM and LAEMMERT (p. 456) have studied the concentration of yellow fever virus, in the blood of certain monkeys and marmosets, which is necessary before certain known mosquito vectors can be

infected by bite. Half the mosquitoes became infected at a concentration of 10^{-3} , and transmission by bite occurred at 10^{-3} .

KUMM (p. 31) studied the seasonal variations in rainfall and the prevalence of *Haemagogus* and jungle yellow fever in Brazil and Colombia. In the rain forest areas of Brazil the maximum rainfall and highest incidence of yellow fever occur in May, and the incidence is probably related to the activities of nut pickers, who at that season climb to the forest canopy. The seasonal incidence in Colombia is similar. In the sparsely forested areas of Brazil the incidence is greatest about February, at the season of highest rainfall and greatest numbers of *Haemagogus*, and is probably related to the clearing of forest which takes place at that time.

LEVI CASTILLO (p. 981) has written a monograph on mosquitoes of the genus *Haemagogus* in South America. Certain criticisms of this are made by Buxton.

Control

MATHIS (p. 456) defends the French yellow fever vaccine prepared from mouse brain, though it does give rise to a considerable number of reactions, in as many as 40 per cent. of persons inoculated subcutaneously. The American vaccine from strain 17D seldom gives reactions. A reasonable compromise is to give the mouse-brain vaccine to persons who already have a basal immunity to the 17D strain, and who require added protection.

In Peru a solution of 2 per cent. DDT in alcohol is used as a larvicide for *Aedes aegypti*. SASSE (p. 207) advocates the addition of 1 ml. of this solution per 6 litres of water, and states that this does not affect the potability of the water. The effect lasts for 4-5 weeks. A successful campaign against *Aedes aegypti* in French Guiana is reported by FLOCH (p. 617), who used DDT.

TEW *et al.* (p. 589) write on the factors affecting the efficiency of procedures for the disinsectization of aircraft. The test insects included *Aedes aegypti*. Details should be sought in the original.

Charles Wilcocks

MALARIA

COVELL, G. **Malaria : its Recognition, Treatment, and Prevention.** *Brit. Med. J.* 1951, Oct. 27, 1021-5.

In this series of refresher courses for general practitioners, Sir Gordon Covell, who is adviser on Malaria to the Ministry of Health and Director of the Malaria Reference Laboratory, Horton, sets out a compendium on malaria covering the chief points that a general practitioner in Britain requires to know.

A brief but adequate account is given of the four recognized aetiological types of malaria, their development and clinical features. The protean symptomatology of *P. falciparum* is stressed, an important warning for practitioners in Britain who may meet it under the guise of many of their more familiar conditions. The methods of diagnosis of malaria are described and full details are given of the preparation and staining of thick and thin blood films. The author points out that the microscopic demonstration of the causative plasmodium is the only certain means of diagnosing malaria : but he also makes it clear that parasites may be present in the peripheral blood in numbers too small for detection during the early days of the attack, so that repeated examination of blood films may be required. At the same time he makes the important point that "there is, in fact, no safe parasite-density level in malignant tertian malaria" and that in certain grave cases, delay in treatment because of negative blood films may prove disastrous ; "in falciparum infections

in non-immune subjects death has been known to occur while parasites were so scanty in the peripheral circulation as to be scarcely detectable even after prolonged search".

The author describes the classes of anti-malarial drugs in use and their mode of action. The specific treatment of clinical malaria is discussed and the advantages and defects of the individual drugs in use are clearly stated. Whatever form is adopted, however, it is advisable to put the patient on a suppressive régime for 8 weeks thereafter to cover the period of possible recrudescence.

Several measures of treatment are briefly mentioned and reference is made to the emergency treatment of pernicious attacks by intravenous or intramuscular injection of anti-malarial drugs. The author does not recommend the intramuscular injection of quinine because of the possibility of necrosis and abscess. Proguanil does not act rapidly enough to warrant its use in cases of extreme urgency and the author recommends the use of mepacrine sulphate intramuscularly or chloroquine by the intramuscular or intravenous routes. Oral medication should be started as soon as the patient can take drugs by the mouth.

Brief reference is given to the treatment of chronic relapsing *P. vivax* malaria and the trials of 8-aminoquinolines for this purpose. The need for close medical supervision is stressed: with members of this group of drugs unpredictable acute intravascular haemolysis may occur. They should not be used as a routine measure.

The manifestations and treatment of blackwater fever are also described. Careful nursing and absolute rest are still essential, but alkali treatment must not be too vigorous lest alkalosis occur: the author recommends that not more than 20 gm. of sodium bicarbonate should be given in 24 hours and that it should be reduced when the urine becomes alkaline merely to maintain a slightly alkaline reaction. In treatment of an accompanying parasitaemia, the 8-aminoquinolines should never be given, for reasons stated above, and quinine is best avoided. Fluid intake should be not less than 2 litres daily and a urinary output of not less than 1.2 litres should be attained.

The various forms of malaria prophylaxis are discussed and the author concludes that "the choice of drug for prophylaxis seems to lie between proguanil and either chloroquine or camoquin". The low grade of toxicity and comparatively low cost of proguanil and its inhibitory effects on gametocytes are great advantages: drug resistance is however known to occur as a result of irregular or insufficient dosage of proguanil in *P. falciparum* malaria, so that instructions should be followed carefully.

Finally a brief note is given on the varying response to particular drugs of different geographical strains of the same species of plasmodium.

H. J. O'D. Burke-Gaffney

MILLETARI, A. Le paludisme en Sicile. [Malaria in Sicily] Congrès Internat. Hyg. et Méd. Méditerranéennes Alger, 3, 4, 5 Avril 1950. 216-20.

The widespread diffusion of malaria in Sicily is due not so much to marshland, which is limited to certain coastal areas, or irrigated lands which are not extensive, as to the innumerable small streams and water-courses which provide, in stagnant pools along their courses, ideal breeding places for anophelines. The three species of *Anopheles* found in Sicily are *A. maculipennis labranchiae*, the most prevalent, *A. claviger* and *A. superpictus*. The first and the last are the important vectors of malaria: after the month of July *A. superpictus* is more abundant than *A. m. labranchiae*. *A. superpictus* is not confined to the hilly regions but is also prevalent in coastal areas, especially

along the northern shore of the island. Even in areas where the breeding of *A. superpictus* is intense the number of adults of that species found in dwellings and animal houses is very limited.

Reclamation work carried out during the 10 years before the last world war had diminished the intensity of endemic malaria, but even so there were in 1951 altogether 5,406 primary cases, 20,400 relapses, 54 cases of pernicious malaria and 92 deaths attributed to that disease. War conditions, notably the movement of masses of troops and civilians from healthy to infected regions, and the importation of new strains of parasite, doubled the incidence of the disease. In 1946 relapses numbered 129,073.

In 1947, DDT spraying was begun, but it was not till 1948 that sufficient DDT was available for the treatment of all houses in infected areas and for the protection of about two-thirds of the urban agglomerations in the island. In that year only 636 primary cases of malaria were recorded and there was no case of pernicious malaria; no death was attributed to malaria. There was a further improvement in 1949. In spite of these results the author does not consider DDT spraying capable of eradicating malaria from the island, but the control of the endemic thus afforded gives time for the elaboration and execution of plans for integral "bonification". There are vector species of *Anopheles* which do not frequent dwellings or outhouses.

The paper concludes with a tribute to the value of Ascoli's adrenaline treatment in an anti-malaria campaign.

Norman White

HOLSTEIN, M. H. Note sur l'épidémiologie du paludisme en Afrique-Occidentale Française. [**Observations on the Epidemiology of Malaria in French West Africa**] *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 3, 463-73, 4 figs.

A list is given of the Anopheline mosquitoes so far described from French West Africa. This list is compared with records from neighbouring West African territories, which include 8 species not yet recorded from the French territories. The distributions of the most interesting species are briefly discussed. The malaria vectors are divided into major vectors (*Anopheles gambiae*, *A. funestus* and *A. rufipes*), secondary vectors (*A. nili* and *A. pharoensis*), and accessory vectors (*A. hancocki* and *A. domicolus*). *A. rufipes* is more important than was formerly supposed, owing to its high infection rate. It is rendered difficult to eradicate by its extraordinary diversity of breeding places, its pronounced exophilism (the ratio of those captured in houses to those captured elsewhere is 1 to 10) its flight range (about 4 km.), the duration of its life-cycle (18 to 21 days) and its anthropophilic habits. *A. gambiae* and *A. funestus* are equally important vectors. According to the region and locality, one or the other may predominate throughout the year, but there is more often an alternation of the two species according to the season, *A. gambiae* predominating during the rainy months, when its development is favoured by the rains, and *A. funestus* during the dry season. It is suggested that investigations in a new district cannot be valuable until they have covered a whole year.

The author studied especially the malarimetric indices in the Bobo-Dioulasso District. They are: spleen rate up to 40 per cent., parasite rate up to 40 per cent., average enlarged spleen 0.65.

A. J. P. Goodchild

DE MEILLON, B. **Malaria Survey of South-west Africa.** *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 3, 333-417, 2 figs.

"A malaria survey of South-West Africa was carried out in the period February to June 1950. In this report the endemicity, entomology, and

parasitology of malaria in South-West Africa north of about latitude 23° south are dealt with.

"The endemicity of the disease was estimated from spleen- and parasite-rates of different age-groups of indigenous native people. The varying degrees of endemicity are classified according to Wilson's four groups. Malaria of the highest endemicity (Wilson's Group I) occurs along the Okavango River and probably on the Kunene and its immediate environs. From there south the degree of endemicity gradually decreases and most of the country south of latitude 19° south falls into Wilson's lowest group. This large area is subject to either localized or widespread epidemics. A map is produced to show the approximate areas of endemicity.

"*Plasmodium falciparum* accounts for 91% of malaria in the areas surveyed. *P. malariae* and *P. vivax* make up the rest in approximately equal proportions. *P. malariae* appears to be restricted to the extreme north. Examinations were made from thick smears and as these do not readily reveal *P. ovale* the incidence of this parasite is not known.

"A fair proportion (17%) of northern labourers who travel to the south for work are gametocyte carriers of *P. falciparum*. It is felt that these people must play some part in the causation of localized epidemics which are a feature of some districts south of about latitude 19° south.

"The climate of South-West Africa is of the desert type, that is, hot days followed by very cold nights. The cold Benguela current flowing up the west coast plays an important part in determining the climate. This climate undoubtedly has an influence on malaria endemicity and is thought to play some part in several instances of 'anophelism without malaria' encountered.

"The presumed vectors are *Anopheles gambiae* over the whole territory plus *A. funestus* on the Okavango and probably the Kunene. Sufficient dissections could not be undertaken to confirm this definitely. The possible role of *A. listeri* as a vector was not settled. The distribution of *gambiae* is shown on a map.

"The bionomics and relation to malaria of *A. gambiae*, *A. funestus*, and *A. listeri* are dealt with in some detail. On the whole, the behaviour of both larvae and adults of *A. gambiae* and *A. funestus* in South-West Africa does not differ materially from that found in other parts of Africa. In some parts of South-West Africa *gambiae* adults were found to be immobilized by the very low temperatures at night and in the early morning. After sunrise and rise in air temperature such immobilized adults revived and bit freely, even in bright sunlight, until late in the morning. This phenomenon may have a bearing on the low incidence of malaria in many parts of the territory where *gambiae* is present in large numbers. *A. listeri* is a house-frequenter in some regions and bites man freely.

"Thirteen additional species of anophelines are added to the known fauna which now consists of the following: *coustani coustani*, *coustani* var. *ziemanni**, *rhodesiensis**, *pretoriensis**, *moucheti* (?)*, *gambiae*, *squamosus*, *listeri*, *rufipes*, *nili**, *funestus*, *ruarinus**, *distinctus**, *pharoensis**, sp. indet.*, *maculipalpis**, *cinereus**, *demeillonii**, *marshalli**. Species marked with an asterisk are new for the territory. The distribution of these species is given and the relationship of the fauna to that of the rest of the Ethiopian geographical region discussed.

"Control and eradication of vectors is not dealt with exhaustively, but it is felt that eradication of *A. gambiae* from the greater part of South-West Africa does not present insuperable difficulties. Control by means of residual insecticides offers the best hope for the highly endemic regions on the Okavango and in Ovamboland." [See also this *Bulletin*, 1951, v. 48, 1060.]

JACOB, V. P. **Some Aspects of Malaria in Jammu and Kashmir State.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 251-60, 3 figs. on pl. & 1 map. [10 refs.]

There are several published records of the anopheline mosquitoes of Jammu and Kashmir but the only record of a malaria survey is a manuscript report by the Epidemiology Department, Jammu (1946). In this report, a spleen rate of 13 per cent. is recorded for the whole of Jammu, a 3 per cent. parasite rate for the northern zone (*Plasmodium falciparum* predominating) and a 10 per cent. parasite rate in the central zone, where *P. vivax* predominated.

The present survey was made between August 1948 and October 1949. The spleen rates ranged between 0 and 60 per cent. at villages situated at altitudes between 1,000 and 11,000 feet above sea level. Twelve species of *Anopheles* were collected, two of them, *A. dhali* and *A. moghulensis*, for the first time in Kashmir.

Endemic and hyperendemic malaria was observed in patchy distribution and the transmission period was from July to September. *Plasmodium vivax* was the only parasite observed at a village about 6,000 feet and it was concluded from the evidence that the infection at this high altitude was autochthonous. At the time of the visit the place was hot and humid and *Anopheles fluviatilis* was found in the houses. This species is strongly suspected as the vector. *A. culicifacies*, which had been previously incriminated, was not encountered above 4,000 feet.

The central plateau (a popular tourist resort) was found to be non-malarious.

H. S. Leeson

JONES, T. W. T. **Malaria Survey of Kyaukpyu, Ramree Island, Burma.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 239-49, 3 maps & 1 fig.

The survey was carried out during the early dry months of 1945. The history, topography and climate of Kyaukpyu are briefly described. Spleen rates obtained in 15 villages ranged from 12 to 70 per cent. and a comparison with the rates recorded in seven of these villages in 1912 by LALOR shows that, with the exception of Taungyin, there has been little reduction. The parasite rate was taken in only one village, Kalaba, and here 5 out of 45 films were positive (11 per cent.), all *P. vivax*. Larvae of 10 species of *Anopheles* were identified alive. The difficulty of distinguishing between larvae of *A. subpictus* and *A. sundaicus* was overcome by breeding out adults in a cage placed in a pond.

It was not possible to dissect female anophelines to obtain the sporozoite rate so, in order to confirm Lalor's 1912 findings that *A. annularis* was the malaria vector, indirect evidence was sought. However, in 3 villages among *A. annularis* breeding places, the spleen rates were the lowest recorded in the whole survey. The highest spleen rates were observed in Zanichaung, where *A. sundaicus* is plentiful during the rains. Further, in Kompanize there was a high spleen rate and much breeding of *A. sundaicus* even in the dry season. From this indirect evidence it is assumed that *A. sundaicus* is a vector of malaria in this area.

H. S. Leeson

AUGUSTE, M. E. **Malaria in Argentina.** *Med. Bull.* New Jersey. 1951, Apr., v. 11, No. 2, 185-97, 2 charts & 5 figs.

This is a report on malaria among employees of the Argentine affiliate of the Standard Oil Company and their families in camps in the north-western part of Argentina and in the town of Tartagal. The population concerned

numbers about 2,000. The area is mountainous and wooded and rainfall is heavy : malaria is endemic. Most of the staff live in camps constructed by the company : some live in neighbouring villages. The population does not live constantly in the protected camps but travels occasionally in unprotected areas.

The only malaria vector found in recent years is *Anopheles pseudopunctipennis* : formerly *A. argyritarsis* also occurred. There has been a steady decline in malaria incidence during recent years. Cases in 1943 and 1944 numbered 319 and 243 : in 1948 and 1949 there were but 17 and 5 cases respectively. In the latter two years there were 20 *P. vivax* infections and 2 *P. falciparum*. It would seem that much of the improvement has been brought about by DDT dusting which was started in 1948 but much attention is still being given to antilarval measures, and houses are screened.

Norman White

LACHMAJEROWA, J. *Biologia Anopheles maculipennis atroparvus* van Thiel na Wybrzeżu (1949/1950 r.). [**Biology of *Anopheles maculipennis* v. Thiel on the Polish Coast**] *Przegląd Epidemiol.* Warsaw. 1950, v. 4, Nos. 1/4, 13-49, 3 figs. & 11 charts. [60 refs.] English summary.

Studies have been made of the mosquito population at an observation point in a cow-shed on the Polish seaboard near Gdynia, with particular reference to the habits of *Anopheles maculipennis atroparvus*. All three ecotypes of the species were present, and were distinguished by the eggs, which were laid when the females were kept for some days in a test-tube containing damp blotting paper. Specimens of *A.m. atroparvus* isolated by this means were examined and measurements were made of the length and width of the ampullae of the oviducts. This ecotype has a strictly limited distribution in Gdynia, on account of the requirements of the larvae which inhabit brackish waters. The larvae constituted 12.8 per cent. of larvae of all three ecotypes collected in water of salinity of up to 0.35 per cent., and 76.6 per cent. in water containing from 0.49 to 0.7 per cent. of salt.

All ecotypes overwinter in cowsheds, at temperatures of 13 to 17°C. In January the ovaries of 65 of 67 *A.m. atroparvus* examined were in the first stage of development, but by March the second stage predominated (in 110 of 149 females), and the third stage was present in 11 females. The insects were active throughout the winter but did not take blood ; they left their winter quarters at the end of March. The mosquitoes wintering in the cowshed were all *atroparvus* ; the other ecotypes entered in spring, and *atroparvus* formed only 61.2 per cent. of the individuals present at the end of May, but this frequency rose again to 90.8 per cent. at the end of August. These fluctuations were due to the appearance of new generations, first of *A.m. messeae* from fresh-water pools, and later *A.m. atroparvus* from brackish waters. Curves are given to show the variation in the size of the ampullae in insects collected between May and August ; the results indicate that insects collected in May were laying eggs for the 5th or 6th time ; the size then diminished as the new generations appeared and rose later to a maximum in July when these generations became mature. It then decreased again on account of the death of the old females and the appearance of the second generations. Large numbers of insects appeared in the cowshed in the middle of September ; the size of the ampullae fell still further between September and November, as *A. m. messeae* and *A. m. typicus* left for cooler hibernating places.

Egg laying began at the end of March : the overwintered females laid fewer eggs (an average of 165) than insects of the new generations ; young females

appeared at the end of May and gave a maximum lay of 238 in June. The average lay then decreased. Details are given of the size of the ampullae in relation to the number of eggs laid. In a final section the morphology of the eggs of *atroparvus* is described.

D. J. Bauer

DE MEILLON, B. **Species and Varieties of Malaria Vectors in Africa and their Bionomics.** *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 3, 419-41. [63 refs.]

"The author lists those species and varieties of malaria vectors in Africa—30 in number—in which naturally occurring infections of human origin have been found, and summarizes the information available on the distribution and adult and larval bionomics of each vector. From the evidence presented a number of conclusions are drawn, though it is pointed out that increased information may lead to their modification.

"The African vectors may be divided into three groups: primary, secondary, and tertiary. The first group—*Anopheles gambiae gambiae*, *funestus funestus* (and *funestus* var. *imerinensis* [Madagascar only])—are the principal vectors over the greater part of Africa south of the Sahara, including the islands of the region. Largely endophilic, they are vectors wherever they are found. Both vectors may be responsible for intense endemic malaria, while *gambiae* is the most important vector of epidemic malaria. The behaviour of both *funestus* and *gambiae* is not uniform in all localities. While it is without doubt influenced by climatic factors, biological races within the species may also exist.

"The second group—*brunnipes* (Leopoldville), *gambiae* var. *melas* (French Guinea, Gold Coast, Ivory Coast, Nigeria, Sierra Leone), *hancocki* (Belgian Congo, Nigeria, Uganda), *hargreavesi* (Southern Nigeria), *moucheti moucheti* (Belgian Congo, Uganda), *nili* (Belgian Congo, Nigeria, Sierra Leone), *pharoensis* (French West Africa), and *rufipes* (French West Africa, ? Sudan)—is of importance in the spread of malaria only in some restricted localities where the primary vectors are absent or rare. Elsewhere they are harmless and mainly exophilic.

"The third group, primarily exophilic and suspected of being short-lived, are unimportant as malaria vectors.

"Malaria control in the region depends upon control of the primary vectors, and of the secondary vectors when the primary vectors are absent or rare."

SENIOR WHITE, R. A. & ADHIKARI, A. K. **Rail Transportation of Mosquitoes.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 261-5. [13 refs.]

There are several reports of mosquitoes being carried by railway trains in different parts of the world. The authors of this paper discuss their own records. On the Bengal-Nagpur Railway, India, weekly catches of mosquitoes were made for many years at three of the stations. Each station was the centre of a mosquito control area and the figures for 4 years show that mosquitoes of 39 species were collected. Eight of these species were caught only in the waiting rooms and four of them, *Anopheles minimus*, *A. splendidus*, *A. maculatus* and *A. karwari*, are species of hilly country and could only have come by train. The other four were culicines, one of them a female *Theobaldia longiareolata*. The nearest known locality for this species is 680 miles away and its presence at Khargpur is inexplicable.

H. S. Leeson

COLLESS, D. H. **The Identity of the Malaria Vector, *A. leucosphyrus*.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 377-83.

There are at least 7 different forms of *Anopheles leucosphyrus*. This paper sets out the results of investigations during the years 1948-49 showing that *A. leucosphyrus balabacensis* is almost certainly the only member of the group involved in malaria transmission in North Borneo, where it is common and widely distributed. *A. l. pujutensis* is also widely distributed but is not so common and *A. l. hackeri* is very rare.

Figures are given for the dissections made on Labuan Island and these show a high natural infection rate in *balabacensis* of 1.6 per cent. gland infections. The fact that no other member of the *leucosphyrus* complex has been reported from Assam and Burma points to *balabacensis* as the vector there also. In Malaya, *A. l. riparis* and *A. l. pujutensis* are the dominant members but there is reason to doubt whether they are of any importance as vectors of malaria, though the type form *A. l. leucosphyrus* may be. The other two forms are *A. l. elegans* and *A. cristatus*.

H. S. Leeson

BONNE-WEPTER, J. *Anopheles venhuisi* n. sp. *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1951, Sept., v. 3, No. 3, 284.

In 1939, VENHUIS [this *Bulletin*, 1940, v. 37, 667] described a variety of *Anopheles hyrcanus* in Java and Celebes which had quite distinct morphological and biological characters and for which he proposed the provisional name of *A. hyrcanus* var. X.

Unfortunately Venhuis died without giving a definite name to his new species. The present author now proposes the name *Anopheles venhuisi* in honour of its discoverer.

H. J. O'D. Burke-Gaffney

CHANG, T. L., WATSON, R. B. & CHOW, C. Y. **Notes on the Seasonal Prevalence of *Anopheles* Mosquitoes in Southern Formosa.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 281-93, 5 charts.

Sixteen species of *Anopheles* are known to occur in Formosa, and of these *A. hyrcanus sinensis* is the most prevalent and the most important vector of malaria in the plains. In the hills *A. minimus* is the vector.

These notes arise from regular catches of mosquitoes made in the southern part of Formosa in the vicinity of Ch'ao Chow from January 1947 to December 1949. Every week mosquitoes were caught by a standardized method for 15 minutes in cattle sheds. Every day all mosquitoes were collected in a specially dug pit. Lastly, all mosquitoes coming to feed on a tethered buffalo were caught throughout alternate half-hours from sunset to sunrise twice monthly.

Nine species were obtained by these methods and it is thought that the cattle-shed collections gave the best idea of the prevalence of *A. hyrcanus sinensis* and *A. minimus*. *A. h. sinensis* has two seasonal peaks in the south; one in February-March and the other during September-October. As this anopheline breeds in irrigated rice fields its seasonal density is influenced by agricultural practice. *A. minimus* breeds in the margins of small streams and irrigation channels. Peak production of adults is in May but as the onset of the rainy season causes flushing, propagation is inhibited and the numbers of this species are not great in this part of Formosa. *A. tessellatus* is second in abundance to *A. h. sinensis* and, like *A. annularis*, is a pool breeder at Ch'ao

Chow; both are commonest in October. The maximum prevalence of *A. sundaicus* occurs in the dry season about February. In the three years only 20 adults of *A. maculatus* and one *A. leucosphyrus* were seen.

H. S. Leeson

CHOW, C. Y., WATSON, R. B. & CHANG, T. L. **Natural Infection of Anopheline Mosquitoes with Malaria Parasites in Formosa.** *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 295-300.

"From January 1947 to December 1949 dissections were made for 60,915 *Anopheles* mosquitoes of eight species: *hyrcanus* var. *sinensis*, *minimus*, *tessellatus*, *annularis*, *subpictus* var. *indefinitus*, *splendidus*, *sundaicus* and *maculatus*. These mosquitoes were collected from diurnal resting places and traps and stored for seven days before dissection.

"Infections of the salivary glands or stomach with malaria parasites were found only in specimens of *sinensis* and *minimus*. Of 45,458 *sinensis* examined, nine (0.0197 per cent) were infected, while of 6,498 *minimus* examined, 11 (0.169 per cent) were infected. These findings confirm the importance of these species as malaria vectors in Formosa.

"Larval filariae resembling *Wuchereria* sp. were sometimes found in the abdomen, thorax, proboscis and head of anophelines. A flagellate resembling *Critidia* sp., which might be confused with sporozoites, was sometimes found in salivary glands."

DOWNES, W. G. Una variante rara de huevecillo de *Anopheles aztecus* Hoffmann 1935. [An Unusual Variant of the Egg of *Anopheles aztecus*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 175-7, 2 figs.

The English summary appended to the paper is as follows:—

"A variant egg type, with patterned exochorion is described for *A. aztecus*, a New World member of the *maculipennis* complex."

MAEGRAITH, B., JONES, E. S. & ANDREWS, W. H. H. **Pathological Processes in Malaria: Progress Report.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 15-33. [73 refs.]

In 1948 Maegraith and his colleagues [this *Bulletin*, 1948, v. 45, 234] commented upon the frequency of centrilobular lesions in the liver in a variety of clinical states, and attributed them to the common factor of liver anoxia. Amongst the clinical states studied, and the one in which these workers were particularly interested, was malaria. In the few years that have since elapsed, they have assiduously studied this disease and the possible mechanisms by which hepatic anoxia may be produced. Their results were presented at a recent meeting of the Royal Society of Tropical Medicine and Hygiene.

Before this theory of hepatic anoxia can be accepted, at least two facts must be incontrovertibly established, namely that malaria causes anoxia, and that anoxia *per se* can produce centrilobular hepatic necrosis. The repeated haemolysis of the parasitized and other erythrocytes and the possibly impaired red cell formation can undoubtedly lead to a severe grade of anaemia in malaria. It is doubtful, however, in view of the large functional reserve of the blood, whether this is ever severe enough, except on very rare occasions. Two other possibilities to account for impairment of oxygen carriage were considered and rejected after the acquisition of further experimental data. The first was the

oxygen utilization of the parasites themselves, the second was the effect of the parasites or their metabolic products upon the dissociation curve of oxyhaemoglobin. While it now cannot be doubted that the parasites do use some oxygen, the quantity is negligible compared with the total carried by the blood ; with regard to the dissociation curve, Sherwood Jones concluded that " Malaria . . . must therefore be added to the long list of diseases in which the dissociation curve of oxyhaemoglobin is normal ".

Impairment of the oxygen supply to the liver may result not only from inadequate oxygen-carrying capacity of the blood, but from retardation or restriction of the blood flow through the liver. Maegraith and his colleagues have therefore studied the hepatic circulation by new techniques, especially by the use of latex corrosion specimens and by perfusion of the surviving organ *in situ*. The results indicate the importance of venous constriction in controlling the hepatic blood flow, not only in dogs, but in rats and guineapigs, whose hepatic veins are supposedly non-muscular. They also suggest a neuro-humoral control since acetyl choline frequently caused an increase in liver volume, associated with a decrease in venous outflow, while adrenaline, on the other hand, produced a decrease in liver volume, associated with a fall, both in inflow and outflow. Many other observers have studied the neuro-humoral factors controlling hepatic circulation. The results have frequently been conflicting, owing, according to Andrews, to the non-physiological state of the liver in many of these experiments. In those reported by Andrews himself, pains were taken to ensure an adequate oxygen supply during the whole time spent in the setting up of the experiment, and the results are therefore less subject to this criticism.

Of great interest to all students of hepatic physiology is the presence or absence of vascular shunts. These were seen by WAKIM and MANN (*Anat. Rec.*, 1942, v. 82, 233) in amphibia but not in mammals : their presence in the latter has been suspected but never definitely proved. The more rapid action of acetyl choline when given *via* the hepatic artery instead of the portal vein, is offered as further evidence of a direct communication between the artery and the hepatic venous system. The possibility of a similar shunt mechanism from the portal vein also arises from the experiments of DANIEL and PRITCHARD (*J. Physiol.* 1951, v. 112, 30P). Using a similar technique to that used by them in their studies on the kidney, they have found that radio-opaque material injected into a tributary of the superior mesenteric vein in a rat may on one occasion render the whole liver opaque, or on another traverse only the central part of the organ, and appear with increased speed in the thoracic vena cava. There can be little doubt that the key to many of the problems of liver pathology lies in the anatomy and physiology of its vascular system. It is equally certain that much remains to be learned of both these aspects of its circulation.

The dependence of the liver upon an adequate supply of oxygen has been demonstrated by many investigators. The liver cell requires oxygen for many of its innumerable metabolic activities, and in the absence of oxygen, it dies. This is shown not only by the effects of arterial occlusion, in which however, a considerable species variation exists, but by the effects of exposing animals to an atmosphere with low oxygen content (MCIVER and WINTER, *J. Clin. Invest.*, 1942, v. 21, 191 ; *Arch. Surg.*, 1943, v. 46, 171). The effects of oxygen deprivation upon the susceptibility of the liver to various poisons such as chloroform and carbon tetrachloride also lead to the same conclusion.

Professor CAMERON, in discussion, assumes an ultra-cautious attitude to the relationship of anoxia to liver disease. This is correct while the evidence is being collected ; the majority of workers, however, feel that sufficient evidence has already been obtained to enable one to conclude with some confidence

that anoxia is a major factor in the production of centrilobular zonal necrosis. As he says, convincing proof can only be obtained from a study of the oxygen content of the hepatic veins in such conditions. GOLDSCHMIDT, RAVDIN and LUCKE (*J. Pharm. Exp. Therap.*, 1937, v. 59, 1), obtained some figures of oxygen saturation in dogs anaesthetized with chloroform. When air was used to volatilize the anaesthetic, the oxygen saturation of the portal and hepatic venous blood was 58.8 and 49.1 per cent. respectively, and liver lesions were frequent and severe. When oxygen was used instead of air, the corresponding figures were 80.8 and 74.1 per cent. respectively, and lesions were slight and few.

It may therefore be accepted that one of the two essential facts required by Maegraith's hypothesis, namely that anoxia can produce centrilobular hepatic necrosis, is well established. It still remains to be proved that in malaria an adequate degree of anoxia is produced or maintained for sufficient length of time. It may be that this does occur, and is due to hepatic venous constriction. The evidence as yet available from the clinic is unfortunately still inadequate to enable this conclusion to be drawn.

L. E. Glynn

PINNA, P. Significato di manifestazioni itteriche e funzionalità epatica in bambini malarici. [**Significance of Jaundice and of Liver Function Tests in Children suffering from Malaria**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Jan., v. 32, No. 1, 16-45, 8 graphs. [29 refs.] English summary.

Signs of hepatic involvement are more marked and occur earlier in malaria attacks in childhood than in adults. The author considers at some length the extensive literature concerning the clinical, functional and histological changes in the liver caused by malaria infections. He describes in detail 6 cases of malaria occurring in children from 2 to 11 years of age, in which catarrhal jaundice complicated the febrile attack. In all cases glycaemia was below normal when determinations were made on patients with empty stomachs, and the rise which followed the administration of adrenaline was but small. In 4 patients the cholesterol content of the blood was below normal. The figures for amino-acids were within normal limits. There was a leucopenia in all cases, only slight in one. Taken together the tests indicated comparatively important damage to liver tissue.

Norman White

WILCOX, Aimee. **Manual for the Microscopical Diagnosis of Malaria in Man.** 2nd Edition. *Nat. Inst. Health Bull. No. 180* (Revised). Wash. 1950. pp. viii+49, 16 pls. (9 coloured.) [64 refs.]

This useful manual is brought up to date in its second edition chiefly by the addition of new knowledge of the life cycle of the malaria parasite. The tissue stages of *Plasmodium gallinaceum*, *P. cynomolgi* and *P. vivax* are described in some detail with coloured illustrations and diagrams. The new diagram showing the life history of *P. vivax* is particularly vivid, with four divisions—mosquito, pre-erythrocytic, blood and exo-erythrocytic cycles respectively.

As the title suggests, the main contents are devoted to the diagnosis of malaria by examination of the blood, and a well-balanced, practical account is given. The thick film is the method of choice for routine use; it is probably 25 times better than the thin film for diagnosis, but it must be remembered that the student should learn the subject from thin films and that detailed morphological work is dependent upon them. Very wisely the author lays down no standard time for examining films: the time spent must vary with the examiner—it is impossible to standardize skill, experience and conscientiousness. She suggests that the examination of 100 fields of a thick film is adequate

in certain circumstances, but if a doubtful parasite is seen, then observation must continue. It may be necessary to take films at repeated intervals before parasites are found, and it is suggested that the most favourable time is half-way between paroxysms. The question of transfer of parasites from one slide to another during the staining of large batches is considered, but is not regarded as "statistically important".

The description of gametocytes is excellent, and the important point is emphasized that it is frequently impossible to distinguish between a large trophozoite and an immature gametocyte of *P. malariae*; the sex of gametocytes is often indeterminable, and in thick films, the rounded "crescent" may be very difficult to diagnose correctly. The unstained vesicular area round the chromatin of the nucleus is called the "zone of carolymph".

P. falciparum is known to behave differently and even to show morphological changes in various parts of the world. The description here would hardly apply to the classical species: the density is stated to be greater in the days between paroxysms (when, as a rule, the parasites begin to leave the peripheral blood), it is suggested that Maurer's spots are only sometimes found [with proper staining in usual infections Maurer's spots can always be obtained, and are an essential feature in diagnosis, particularly of mixed infections], the presegmenting and mature schizont, as illustrated, practically fills the red cell (instead of occupying only two-thirds). "Tenue" forms of the parasite are called by the less usual name "slender forms".

Many methods for the enumeration of parasites exist, none is very satisfactory, and the author recommends what is probably the simplest, and at the same time reasonably accurate: the parasites are counted against the leucocytes in a thick film, a white blood count being done at the same time.

There is no description of either Field's or J.S.B. rapid staining methods. Few people would deny the superiority of Giemsa's stain over all others for malaria parasites, but there still remains a place for these very quick methods which are invaluable in certain circumstances.

All workers will find something of interest in this manual; it is also an ideal little book for the beginner, providing him with all the practical details of the subject.

P. C. C. Garnham

DOCKEY, G. C. **Acute Mepacrine Poisoning.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 275-8.

Three African infants, aged 7 months, 8 months and one year respectively, who were convalescing from non-tuberculous pulmonary infections, each had a sharp rise of temperature which was suspected to be due to malaria. Each infant was given intramuscularly the contents of an ampoule believed to contain 100 mgm. of mepacrine, but which in fact contained three times this amount of the drug. The two younger infants died within half an hour of receiving the injection, while the third nearly died, but recovered after treatment with oxygen and coramine. The post-mortem reports on the two fatal cases gave the cause of death as heart failure due to an intramuscular injection of 300 mgm. of mepacrine, the first infant having suffered from lobar pneumonia and malnutrition and the second from bronchopneumonia and a small empyema. In both cases blood smears taken before death proved negative for malaria parasites.

The author concludes that intramuscular mepacrine in an overdosage of 300 mgm. may be rapidly fatal to sick African infants aged 7 months to one year, and draws attention to a paper by BRUCE-CHWATT and BRUCE-CHWATT this *Bulletin*, 1950, v. 47, 956] in which were recorded 11 cases of acute toxic

reactions, one of which proved fatal, in infants or small children given "normal therapeutic doses between gramme 0.05 and 0.15". Stress is laid on the danger of prescribing drugs by the ampoule or tablet without specifying the exact quantity to be given at each dose. In conclusion emphasis is laid on the fact that in general mepacrine is a very safe drug which has been given to many thousands of persons without ill-effect.

G. Covell

FRASER, G. P. & KERMACK, W. O. **The Reaction of "Paludrine" (Proguanil) with Ethyl Acetoacetate.** *J. Chem. Soc.* 1951, Oct., 2682-6.

LAVIER, G. & SCHNEIDER, J. Le traitement du paludisme chez l'enfant. [**The Treatment of Malaria in Children**] 26 pp. [106 refs.] [Report presented at XIII^e Congrès des Pédiatres de Langue Française (Alger, 7-8-9 mai 1951).]

The subject is dealt with under 3 headings: (1) treatment of the acute attack; (2) prevention of relapse; and (3) treatment of chronic malaria.

The basic requirement for treatment of the attack is the administration of a schizonticidal drug, of which the most active now available are various members of the 4-aminoquinoline series (nivaquine, chloroquine, aralen, camoquin). When these are administered by the mouth, toxic effects are only very exceptionally encountered. Great care is however necessary in giving such drugs parenterally; the dosage should be calculated strictly according to the weight of the child, and the injection given slowly, in dilute solution and in fractional amounts. The parenteral route should never be used unless it is impossible for the patient to absorb the drug by the mouth or *per rectum*. In any case, intravenous injections should never be given to very young infants. The importance of counteracting shock in severe cases should not be lost sight of.

Stress is laid on the necessity of determining not only whether the child is suffering from malaria, but also the species of parasite concerned. In *P. falciparum* malaria the administration of a schizonticidal drug in sufficient dosage will in most cases effect radical cure. In *P. malariae* and *P. vivax* infections a more prolonged schizonticidal treatment is indicated and this should be followed up with a course of one of the 8-aminoquinolines (pamaquin, rhodoquine, pentaquine). Treatment on such lines will result in a marked reduction in the incidence of relapse, provided that the patient is protected from the chance of reinfection.

For the treatment of chronic malaria the use of specific drugs may be supplemented with other measures, such as the various vitamins, particularly vitamin A, preparations of iron and arsenic and the adrenaline therapy for enlarged spleen advocated by Ascoli and his colleagues.

G. Covell

JOSEPHSON, E. S., GREENBERG, J., TAYLOR, D. JANE & BAMI, H. L. **A Metabolite of Pamaquine from Chickens.** *J. Pharmacol. & Exper. Therap.* 1951, Sept., v. 103, No. 1, 7-9.

"One of the products of pamaquine metabolism following a single oral dose of this drug to chickens is 8-(diethylamino-1-methylbutylamino)-5,6-quinoline-quinone. Proof of structure of this metabolite is based upon its conversion to the quinoxaline following interaction with orthophenylene-diamine and comparing the crystalline dipicrate of the resulting product with that obtained from synthetic 8-(diethylamino-1-methylbutylamino)-5,6-quinolinequinone treated in similar fashion."

NEELAKANTAN, L., IYER, B. H. & GUHA, P. C. **Studies in Antimalarials. Part XI. N-Alkyl-3-Phenyl Chelidamic Acid Derivatives.** *J. Indian Inst. Sci.* 1949, v. 31A, Pt. 5, 51-5.

NEELAKANTAN, L., IYER, B. H. & GUHA, P. C. **Studies in Antimalarials. Part XII. N-Aryl-3-Phenyl Chelidamic Acids.** *J. Indian Inst. Sci.* 1949, v. 31A, Pt. 6, 57-9.

NOR EL-DIN, G. **Aureomycin in the Treatment of Malaria.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 7, 444-8.

Six cases of *vivax* and one of *falciparum* malaria were treated with aureomycin, the dosage in most cases being "3 tablets of 0.5 gm. every six hours for five days. The total dose given over five days was 15 gm." [This schedule in fact amounts to 30 gm. and not 15 gm. as stated. Furthermore, in the last sentence of the author's paper is the alarming statement: "A dose of 500 gm. aureomycin given intravenously maintains a high level in the blood for 12 hours or more".]. The average time of disappearance of asexual parasites from the peripheral circulation as judged from examination of thick blood smears was 3 to 4 days. The temperature fell to normal in most cases on the third day after treatment was commenced. The *falciparum* patient, who before treatment "used to have a daily bout of fever in the afternoon", had no more fever after the second day of treatment, but parasites persisted in the peripheral blood for a further two days. The cases were not followed up for a sufficient time to allow any conclusion to be drawn as to the value of the drug in the prevention of relapse. No information is given as to the state of premunity of the patients or the stage of the attack at which treatment was commenced.

[COATNEY and his colleagues (this *Bulletin*, 1950, v. 47, 438; 1951, v. 48, 523) in experiments with the Chesson strain of *Plasmodium vivax*, have shown that aureomycin either inhibits development of pre-erythrocytic parasites or by residual action interferes with the survival and multiplication of early erythrocytic forms. The drug was not curative and its action on erythrocytic forms was too slow to be of practical value in the treatment of an acute malarial attack.]

G. Covell

CLAVERO, G. La lucha antipalúdica en España. [**The Anti-Malaria Campaign in Spain**] *Rev. Sanidad e Hig. Pública.* Madrid. 1950, Mar., v. 24, No. 3, 149-70.

In this address the author reviews the developments that anti-malaria measures in Spain have undergone in recent years. An account is given of the work that has been done during the past two decades on the identification and distribution of *Anopheles* species in that country: *A. maculipennis subalpinus*, whose zoophile feeding habits explain the low malaria incidence in rice-growing areas of Valencia, for example, in spite of the high prevalence of this species; *A. maculipennis labranchiae*, markedly anthropophile, responsible for much malaria in Murcia and Alicante; *A. hispaniola*, a vector of some importance, which has recently extended its area of distribution in the mountainous regions of Murcia, Granada, Cordova and Seville; *A. algeriensis* occurs in the coastal area of Alicante, Murcia and Almeira; *A. plumbeus* has been identified in Cuenca and Valencia but is too rare to be of importance in malaria transmission; *A. marteri* has also been found in Murcia and Cuenca; *A. multicolor* was found in Murcia in 1946, the first report of the presence of this species on European soil. Concurrently with these studies of anophelines an investigation has been made on the prevalence and distribution of *Aedes* species; 21 species of *Aedes* are listed.

Up to 1945 anti-mosquito measures were directed exclusively against the larvae: all the time-honoured methods were used with varying success. DDT was first used in 1945, first as a larvicide and subsequently as a residual insecticide against the adult. An emulsion of DDT and Gammexane has been found to be most efficient. With a dose of 2 gm. of DDT per square metre of surface a single spraying is done in the month of March. When half this dose

is used a second spraying at the end of June is recommended. Difficulties arise in certain rural areas where a large proportion of the population live in the open-air in harvest time, passing the night in improvised shacks and shelters. Certain of the rarer species, *A. hispaniola*, *A. algeriensis* and *A. multicolor* rarely frequent human dwellings; the last two species most frequently bite in the open-air.

Since 1944 special attention has been given to the medical treatment, during the months of March and April, of persons who had suffered from malaria during the previous year. For this purpose much is hoped of chloroquine.

The address ends with an appraisal of the merits and limitations of some of the synthetic anti-malarial drugs now in common use. Norman White

DAVIDSON, G. **Results of Recent Experiments on the Use of DDT and BHC against Adult Mosquitos at Taveta, Kenya.** *Bull. World Health Organization*. Geneva. 1951, v. 4, No. 3, 329-32.

Like WILKINSON [this *Bulletin*, 1951, v. 48, 1074] the author has repeated experiments of the type initiated by MUIRHEAD-THOMSON [*ibid.*, 1950, v. 47, 439] to compare the effectiveness against mosquitoes of walls sprayed with DDT and BHC. Four experimental huts, fitted with window traps, were constructed. One hut was sprayed with "Gammexane" "P.530" at 0.15 gm. BHC [probably 12 per cent. gamma isomer] per square foot; one with DDT wettable powder "Ditrene" at 0.1 gm. DDT per sq. ft.; and one with a DDT oil-bound suspension at 0.3 gm. DDT per sq. ft.; the fourth hut was left untreated as a control. Each night the huts were occupied by one or more Africans. In the mornings, observations were made of live and dead mosquitoes in the huts and in the window traps. This continued for 6 months; but, unfortunately, the numbers of mosquitoes fell considerably after the first month.

Nevertheless, the results in the first month showed that the BHC was more effective than the DDT, as recorded by Muirhead-Thomson. Nearly all the mosquitoes (*Anopheles gambiae* and *A. funestus*) were found dead in the BHC hut, and the few which reached the window traps died in a few hours. The effect declined with time, but even after 6 months there was some effect (30 per cent. of the mosquitoes caught alive in the hut died within 24 hours).

In the DDT hut, a considerable number of mosquitoes escaped to the window trap during the first month; of these only 80 per cent. died within 24 hours. The comparative inefficiency of DDT was less marked than Muirhead-Thomson reported, but it is known that he used "Ditrene", which was less effective than the oil-bound suspension, and did not chemically estimate his deposits [*cf.* Wilkinson].

The irritant and non-lethal action of some DDT deposits were further illustrated by laboratory tests with *A. gambiae* and *A. funestus*. The mosquitoes were allowed choice of entering chambers (2-ft. cubes) treated with DDT or BHC. After a certain time, the treatments caused irritation and flying; this time, and the subsequent mortalities observed, averaged as follows:

			Time before flying (min.)		24-hour mortality (per cent.)	
			DDT	BHC	DDT	BHC
<i>A. gambiae</i>	...	...	12	26	20	85
<i>A. funestus</i>	...	...	11	16	62	100

J. R. Busvine

VISWANATHAN, D. K. & GADRE, S. B. **Field Experiments to determine the relative Efficiency in Malaria Control of different Dosage Regimens of Dichloro-Diphenyl-Trichloroethane (D.D.T.) as judged by Mosquito Densities, Spleen Rates, Parasite Rates and Chemical Estimation of the Residual Deposits of D.D.T. at Varying Intervals after each Application as an Indoor Spray.** *Indian J. Malariology*. 1950, Dec., v. 4, No. 4, 487-503. [12 refs.]

In most areas 200 mgm. per sq. ft. of wall surface is a commonly accepted dosage of DDT when applied as a residual insecticide. The number of applications depends on the length of the malaria transmission season, but the intervals are not less than 3 months. In India, Viswanathan and others have used a dosage of 56 mgm. DDT per sq. ft. at 6- to 8-week intervals [see this *Bulletin*, 1949, v. 46, 16]. Would a single large dose be just as effective? If so, a large saving in expenditure on labour and supervision would result. Therefore the relative merits of a single large dosage and multiple smaller dosages were assessed in a field experiment which involved three groups of villages with a total population of 683,300 in Bombay State. The season of control measures covered four months, the vector was *A. culicifacies* (sporozoite rate 0.54 per cent.), the parasites in equal proportions of *P. vivax* and *P. falciparum*, spleen rate average 46.1 per cent., and parasite rate 11.2 per cent. The plan of action is described and results are tabulated. The residual DDT applications used were: (a) single of 168 mgm./sq. ft.; (b) two of 112 and 56 mgm./sq. ft. respectively, with 6-week interval; (c) three of 56 mgm./sq. ft. with 6-week intervals. Six weeks after the large dosages of (a) and (b) had been applied the densities of *A. culicifacies* had returned to a level comparable with that in the unsprayed control villages; this observation was similar to those obtained previously for 56 mgm./sq. ft. but through lack of data was not confirmed on this occasion in (c) group of villages. Chemical examination of residual deposits revealed absence of DDT at the 17th week in the (a) group (no tests before 17th week); in the (c) group at the end of 6 weeks the deposit was down to 10 mgm./sq. ft., which is considered to be the minimum effective wall concentration; this loss appears to be at the rate of 20 per cent. per week. On this basis, after the 168 mgm./sq. ft. concentration, there should remain at the 6th week a DDT deposit of 48 mgm./sq. ft., which was not the case in the (a) villages. The authors admit certain limitations in this large-scale experiment but no evidence is forthcoming to indicate the superiority of the single large dose (168 mgm./sq. ft.) of DDT over three applications (56 mgm./sq. ft.) at 6-week intervals. The spleen, parasite and infant malaria rates tend to confirm this conclusion.

R. Ford Tredre

VISWANATHAN, D. K., RAMACHANDRA RAO, T. & JUNEJA, M. R. **Further Notes on the Use of Benzene Hexachloride as a Residual Insecticide compared with Dichloro-Diphenyl-Trichloroethane.** *Indian J. Malariology*. 1950, Dec., v. 4, No. 4, 505-31, 1 chart.

In a district 80 miles north of Bombay City 5 villages (pop. 7,100) were treated with Gammexane P.520 (11 mgm. per sq. ft.), 3 (pop. 2,050) with a 5 per cent. emulsion of DDT (56 mgm. per sq. ft.), and 3 (pop. 2,300) were untreated as controls. Among 21 species of anophelines in the area *A. fluviatilis* and *A. culicifacies* are deemed to be the malaria vectors, though the small numbers dissected were not infected.

First applications of insecticides were made in the middle of July at the commencement of the malaria season. The density of the predominant anopheline, *A. culicifacies*, rose to critical levels 12 weeks later in the Gammexane villages and 16 weeks later in the DDT villages. Therefore at the 14th

and 19th weeks a second spraying took place. The degree of reduction in density of this anopheline was "far more marked" in the DDT than in the Gammexane villages.

Detailed tables of spleen and parasite rates, infant parasite rates and dispensary attendances are provided. Indications of successful interference with transmission are evident for both treated groups in comparison to the controls, and the difference, if any, between the treated groups favours DDT. The authors conclude that DDT appears to be the insecticide of choice, but BHC is also successful in control of malaria. Which to use hinges on costs locally, bearing in mind that Gammexane P.520 is a wettable powder and that the DDT spray was in emulsion form. This latter formulation the authors believe to be more effective than DDT wettable powder, for which they had no comparative data in this experiment.

R. Ford Tredre

KRUSE, C. W. & KONCHADY, D. **Some Considerations on Indoor Residual Spraying for Malaria Control in Rural India.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 267-79, 2 charts. [15 refs.]

"The principal surfaces upon which residual insecticides are to be applied in rural India are clay walls and thatch roofs. While the surface of the thatch remains toxic unusually long, the mud or clay wall, uncoated, presents an extremely rapid loss in toxicity. Evidence is presented which confirms findings by others that water-wettable suspensions of D.D.T. are vastly superior to emulsions of D.D.T. on mud wall surfaces. The use of suspensions should be further encouraged because the uniformity of application may more easily be checked in the field by observing the residues of inert materials. Also, additional economies may be expected through simpler mixing procedures, ease in handling and transporting the powders in contrast to solution or emulsion. Modifications in equipment will be required to provide agitation of the suspension. Data is presented to show that a cheap, simple wall surfacing with a mixture of cowdung and coconut charcoal will significantly enhance the duration of toxicity. The prevailing opinion of lack of residual effect of pyrethrum and synergist seems to be questionable especially when applied on cowdung and coconut charcoal-treated surfaces and protected from direct light. The laboratory results with water-wettable pyrenone justify further investigation of pyrethrins and synergist for use in residual house spraying. Evidence is presented to show that deposits of soot from an open fire can coat the thatch sufficiently to partially or completely destroy the residual toxicity of D.D.T."

MACKERRAS, I. M., RATCLIFFE, F. N., GILMOUR, D. & MULES, M. W. **The Dispersal of DDT from Aircraft for Mosquito Control. An Account of Experiments on the Use of Combat Aircraft for Aerial Spraying.** *Commonwealth Sci. and Indust. Res. Organization, Australia, Bull. No. 257*. 64 pp., 14 text figs. & 18 figs. on 9 pls. 1950. Melbourne.

The authors describe experiments carried out in 1944 and 1945 in Australia, and under service conditions in New Guinea and the Solomon Islands. The paper gives what is probably the best available account of the development of the elaborate technique of insecticidal spraying from the air. This entails not only precise flying, but attention to lay-out on the ground; also estimations of results, by physical and chemical methods, and in terms of destruction of insects.

It was not until after the discovery of DDT as an insecticide that serious attention was given to the use of aircraft for mosquito control. It seems that in 1944, Americans, flying light aircraft, found that a high proportion of adult

Aedes, even sheltered by dense mangrove, could be killed by the distribution of 2 U.S. quarts per acre of a 5 per cent. solution of DDT. The Australian development of this was to work out methods of putting down some such dose of the same solution from combat aircraft, of which the most suitable was the Beaufort. This machine possesses wing tanks which could be rapidly emptied by the operation of a "fuel dumping mechanism". It was easy to adapt this to spraying, these wing tanks being cut off from the other fuel tanks, and the outlet reduced. When additional tanks were added the machine had a capacity of 320 imperial gallons of spray, which could be liberated in such a way as to put down approximately the required dose per acre.

One method of sampling the dose received on the ground was to receive a deposit of the dyed spray on an enamel plate. The spray was washed off and the concentration of dye, and therefore the quantity of oil received, were determined colorimetrically. In addition, rows of absorbent paper were spread out on the ground and the size of the drops recorded. As the diameter of the spot had been previously calibrated with drops of known volume, this method gave information as to the frequency distribution of drop size. Neither of these methods gave information dealing with the very small droplets (which would now be estimated in a different way) which are suspected of being of great importance in killing mosquitoes sheltering in leaves, under stems and in such places. One notes that, assessed in this careful way, the amount of oil which reached the target from the aircraft was between 28 and 53 per cent., which is a sufficient criticism of much published work, which assumes that insecticide released from the aircraft actually arrives on the target.

When the matter was considered from the pilot's point of view, the conclusion was reached that, with this type of aircraft, the flights should be at a height of 100 feet above the ground, and the runs should be spaced 100 yards apart, provided the wind speed was between 4 and 10 miles per hour. At a later stage, when further attention had been given to the smaller droplets, it was felt that lower wind speeds than the above were desirable, because the small droplets are so readily carried away to great distances.

The report describes the gradual development of the method from preliminary experiments, in which a single run was carried out, to more detailed work in Queensland, over coastal areas with a dense population of *Aedes vigilax*. In many of the experiments the position is made clear by excellent plans showing the topography, wind direction, and the grid of flights which were carried out. The work was then transferred to New Guinea, where experiments were carried out under the very different climatic conditions prevailing there, and where it became apparent that nocturnal *Anopheles* (*A. punctulatus*) as well as diurnal *Aedes* of various species could be satisfactorily killed by this method. There was also a valuable destruction of larvae which were probably destroyed by the larger droplets spreading over the surface of the water. [One of the few points not mentioned in the report is the spreading pressure of the oil.] The volume of spray per acre used in successful trials was from 2 to 2½ quarts, which killed over 90 per cent. of anopheline adults and practically all the larvae. It was necessary to spray when the wind velocity was low and soon after dawn, before the sun had warmed the ground and produced up-currents. In New Guinea, the method proved to be capable of being used on very broken ground, with ridges and deep gulleys.

At a later state, similar operations were carried out, still by Beauforts, as a method of control under active service conditions. One notes that on several occasions, air sprays were put down to destroy immense numbers of houseflies, breeding in very insanitary Japanese camps. The method proved highly successful against these insects.

The paper is illustrated with figures and photographs which give one a good idea of the dense and difficult vegetation in which it was found possible to destroy a high proportion of resting adult mosquitoes. It contains an immense amount of interesting detail, satisfactorily recorded, and is the fullest account we have of this method. One notes with regret that British work, particularly on the physico-chemical side, which is the basis of the whole method, receives no reference, though the ingenious American developments are acknowledged.

The paper contains no references to putting down smokes from the air, and is confined to oil solutions. P. A. Buxton

DOWNES, W. G., BORDAS, E. & ENRÍQUEZ CHÁVEZ, A. El control del paludismo en la región de Xochimilco, D.F. [**Control of Malaria in the Xochimilco Region (Mexico)**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 99-105.

The English summary appended to the paper is as follows :—

"A malaria control program consisting of DDT residual spraying in the Xochimilco-Mixquic region of the Valley of Mexico is described. The zone is a region of low endemicity of *P. vivax* with *A. aztecus* the vector. Following control work, spleen rates dropped markedly and parasite rates fell to zero. Recommendations for future work are that spraying be repeated once every two years."

GUTIÉRREZ F., J., NEGhme R., A. & ALBÍ DE LA FUENTE, H. Estado actual del control del anofelismo en Chile. [**Present Position of Anopheline Control in Chile**] *Rev. Chilena Hig. y Med. Preventiva*. 1950, Sept.-Dec., v. 12, Nos. 3/4, 67-71, 2 figs. & 1 folding map. English summary.

Since 1937, an anti-malarial campaign has been in progress in the province of Tarapaca, Chile (between latitudes 18° and 20°30' south). The sole vector in the Chilean valleys was *Anopheles pseudopunctipennis*, a semi-domestic, moderately zoophilic mosquito. At first the mosquito was attacked by larvicides, but DDT house-spraying was introduced in 1945. The dosage rate in the first two years was inadequate and 3 or 4 treatments per year were required; since 1947, however, 1.1 to 3.9 gm. per m². has been applied. As a result of this work, adult mosquitoes disappeared, the last examples being seen in 1947. The numbers of larval foci likewise declined, but sporadic breeding still occurs, sometimes in sites which have been free 1 or 2 years. This emphasizes the importance of continuing the work for several years. No autochthonous cases of malaria have been observed since 1945. J. R. Busvine

VENKATARAMANAN, K. **Vegetable and Essential Oils as Mosquito Larvicides : a Report of some Preliminary Investigations.** *Indian J. Malariology*. 1950, Dec., v. 4, No. 4, 449-54. [10 refs.]

The author, in Bangalore, is interested in the possibility of substituting some indigenous vegetable product for mineral oils which might become expensive or unobtainable. He points out that some information exists on the effect of adding small proportions of castor oil and other vegetable products to mineral oils : this increases the spread and larvicidal efficiency, but is regarded as outside the scope of the enquiry.

Tests on a number of vegetable oils are described, among them, ground-nut oil, mustard oil, oil of sesame (gingelly). These are tested by simple physical methods to determine the specific gravity, viscosity, spreading power on water, and toxicity to mosquito larvae. Nearly all the vegetable oils spread well on water, except oil from the shell of the cashew nut. All were, however, so viscous

that they did not enter the tracheae of mosquito larvae which could live under a film of the oil.

Two essential oils, pine oil and lemon-grass oil, were tested. They spread easily on water and entered tracheae: in comparison with malariol, a smaller dose of essential oil gave a satisfactory kill, practically all larvae being killed by quantities between 0.1 and 0.5 cc. on an area with a diameter of 30 cm.

Field tests were carried out on cesspools, from which it was found that the dose per sq. ft. giving a kill approximating to 100 per cent. was 0.5 cc. of essential oil in an emulsion, or 2.0 cc. of malariol.

P. A. Buxton

JASWANT SINGH & NAIR, C. P. **Leucocyte Count in Normal *Silenus rhesus* and *sinicus* Monkeys.** *Indian J. Malariology.* 1950, Dec., v. 4, No. 4, 467-70.

White blood counts of two rhesus (*Macaca mulatta*) and three sinicus (*Macaca sinica*) monkeys were studied over periods of several weeks. All the counts showed a wide range on different days, the figures of one rhesus monkey varying from 6,000 to 25,000, for the other from 4,000 to 16,000, while the sinicus showed an even greater range from a minimum of 5,000 to a maximum of 48,000. On any one day, the leucocyte count of the rhesus monkeys remained fairly constant and it was obvious that the time of feeding played no part in the fluctuations. The use of the erythrocyte count is thus to be preferred to the leucocyte count in calculating blood parasite densities.

P. C. C. Garnham

JASWANT SINGH, NAIR, C. P. & BASU, P. C. **Activity of Bromo Analogue of Paludrine (Bromoguanide) against Avian and Simian Malarials.** *Indian J. Malariology.* 1950, Dec., v. 4, No. 4, 455-65. [11 refs.]

In a previous communication [JASWANT SINGH *et al.*, this *Bulletin*, 1950, v. 47, 1186] the authors reported the screening of a number of biguanide derivatives for anti-malarial activity against *Plasmodium gallinaceum* in chicks and *P. knowlesi* in rhesus monkeys. The most active of these, bromoguanide, is the subject of further studies now recorded. The drug is similar to proguanil, the difference being that the chlorine atom at the para-position of the phenyl ring is replaced by bromine.

Therapeutic trials were carried out against *P. gallinaceum* in fowls and *P. knowlesi*, *P. cynomolgi* and *P. inui* in monkeys. Parasites were cleared from the peripheral circulation within an average period of 78 hours in the case of *P. gallinaceum*, 164 hours with *P. knowlesi*, 128 hours with *P. cynomolgi* and 145 hours with *P. inui*. The action of the drug in this respect was slower than that of proguanil, relapses were more frequent and toxicity considerably greater. [It seems unlikely that bromoguanide will prove of practical value in the treatment of human malaria.]

G. Covell

TREMBLEY, Helen L.; GREENBERG, J.; COATNEY, G. R. **Strain Differences in *Plasmodium gallinaceum* Brumpt. II. Experiences with the Sporozoite and Single Oocyst Passage of the BI Strain** [TREMBLEY, GREENBERG & COATNEY]. *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 68-75, 1 fig. **III. The Spontaneous Conversion of a Phanerozoite-producing SP Strain to a Phanerozoiteless M Strain through Mosquito Passage** [TREMBLEY, GREENBERG & COATNEY]. *Ibid.*, 76-81, 1 fig. **IV. Experiences with the Blood Passage of the Phanerozoiteless M Strain** [GREENBERG, TREMBLEY & COATNEY]. *Ibid.*, 82-9. [16 refs.]

I. In a previous paper [this *Bulletin*, 1951, v. 48, 620] it was shown that in strain BI of *Plasmodium gallinaceum* the exo-erythrocytic stages did not form

merozoites capable of developing in erythrocytes, while the sporozoites of this strain produced EE infections, though occasionally gametocytes were also present. Such infections, when passaged through mosquitoes, gave rise to a strain developing normally in the erythrocytes [HAAS *et al.*, *ibid.*, 1949, v. 46, 108]. In the first paper of the present series an account is given of attempts to repeat these experiments with *Aedes aegypti* as vectors and one-week-old chicks as vertebrate hosts. In one set of experiments, 290 chicks were inoculated with varying numbers of sporozoites of the blood-passaged BI strain, with the result that 270 acquired purely EE infections, and only one chick developed a chronic infection with normal parasitaemia, but in subsequent passages there was again a predominance of EE forms. However, when a single oöcyst derived from this chronic infection was inoculated into a chick, a chronic erythrocytic infection was produced and maintained through two successive passages. The oöcyst inoculation thus resulted in the transformation of strain BI into a strain giving rise to normal parasitaemia with gametocytes.

II. Strain SP of *P. gallinaceum* [*ibid.*, 1951, v. 48, 620] normally produces EE parasites, trophozoites and gametocytes developing concurrently. In the second paper a description is given of changes undergone by this strain in the course of consecutive cyclical passages through 20 mosquitoes over a period of about 27 months. In the early passages practically all the chicks inoculated with sporozoites became infected, most of them dying as the result of EE infection. However, between the 13th and 15th passages this strain underwent a change, manifested in a decline of the infectivity and virulence, none of the chicks after the 15th passage having died of EE infection. This modification of the characteristics of strain SP is attributed to the fact that the three passages in question (13-15) were made from donors with chronic infection (instead of the usual acute infection) resulting from small inocula of sporozoites. Like the strain (M) described by Haas [*loc. cit.*], the modified SP strain is characterized by almost complete absence of EE forms.

III. In the third paper a description is given of observations on the behaviour of Haas's strain M when passaged from chick to chick by blood inoculation. This strain has been maintained for several years by mosquito-chick passages without producing any EE forms. Consecutive weekly passages by blood inoculation brought about a change in the characteristics of strain M after from 15 to 42 passages in different sets of experiments. It increased in virulence; killing more chicks during the period of parasitaemia, while those which survived succumbed to EE infection. The EE development, acquired by the modified strain, was maintained through 22 consecutive cyclical transmissions!

C. A. Hoare

RAO, R. R., RAMASWAMY, A. S. & DE, N. N. **A Method for preparing Concentrates of Malarial Parasites from Chicks infected with *P. gallinaceum*.** *Indian Med. Gaz.* 1951, Apr., v. 86, No. 4, 147-8, 5 figs. on pl.

Concentrates of erythrocytes parasitized with *Plasmodium gallinaceum* were prepared as follows: heparinized blood containing 20-30 per cent. of parasites was added to an equal volume of egg albumin solution of specific gravity 1.032 and pH 7.2 at 5°C. The mixture was centrifuged and the plasma and buffy layer were pipetted off and mixed with 3 times the volume of normal saline. Slow centrifugation brought down a sediment containing twice the original concentration of parasites.

Free parasites of *P. gallinaceum* were prepared by mixing one part of infected blood with 20 parts of heparinized normal saline buffered to pH 7.0. This was centrifuged for 15 minutes, the process was repeated and the packed red cells were suspended in saponin solution (0.02 per cent.), 1 cc. of cells to 20 cc. of

saponin. After shaking and centrifuging, the cells became emptied of their haemoglobin and were ready for digestion with a trypsin solution (0.125 per cent.), in which they were repeatedly centrifuged and were stored for about $2\frac{1}{2}$ hours—the process of digestion being watched under the microscope. The material was finally washed twice with normal saline and was found to consist of malaria parasites free from erythrocytes, though mixed with leucocytes.

P. C. C. Garnham

STAUBER, L. A., WALKER, H. A. & RICHARDSON, A. P. **The in vitro Agglutination of Erythrocyte-Free Avian Plasmodia.** *J. Infect. Dis.* 1951, July-Aug., v. 89, No. 1, 31-4. [10 refs.]

Antigens were prepared by enzyme digestion of corpuscles, haemolysed with saponin, which had been infected either with *Plasmodium lophurae* or *P. cathemerium*. The plasmodia, free of erythrocytes, were then usually suspended in 0.2 per cent. formalin, the suspension remaining stable for at least 2 years.

Antisera were made by injecting rabbits or ducks with parasites, either free (as prepared in the antigen) or in their normal habitat (*i.e.*, intra-corpuscular). The antisera were then treated to remove non-specific agglutinins by adsorption, first on digested residue of corpuscles, then on fresh erythrocytes.

The test was performed on a slide with 1 drop of antigen diluted in buffered saline and 1 drop of antiserum in varying dilutions. Agglutination was classified from + to + + + +, the first being scarcely visible, the last being easily visible to the naked eye. The reaction is easier to read in *P. lophurae* antigens than in *P. cathemerium*—probably because the former parasite is more heavily pigmented.

The results showed the presence of natural agglutinins in the sera of normal ducks and rabbits. In addition, the sera of immunized animals showed agglutination in dilutions up to 1 : 80, the phenomenon being more marked in rabbits than ducks. The serum of rabbits immunized against *P. cathemerium* was also able to agglutinate suspensions of *P. lophurae*. Further experiments, with the use of adsorption methods, demonstrated the existence of group as well as specific agglutinins in the three avian parasites—*P. lophurae*, *P. circumflexum* and *P. cathemerium*, the last two parasites being more closely related. The authors suggested that it may be possible to differentiate strains of a single parasite by this method. It should be noted that immune (and adsorbed) serum is unable, except in the lowest dilutions, to agglutinate parasites protected by their usual erythrocyte cover.

P. C. C. Garnham

TRYPANOSOMIASIS

KLEINSCHMIDT, A. & SCHLEICH, F. Über den Feinbau von Trypanosomen.

II. Geisseluntersuchungen. [The Finer Structure of Trypanosomes.

II. Studies on the Flagellum] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 42-6, 6 figs. [10 refs.]

The structure of the flagellum of *Trypanosoma brucei* was studied by electron microscopy, with the use of the following technique. The plasma of an infected mouse was mixed with Locke's solution containing 0.5 per cent. glucose ; the mixture was centrifuged and the resulting suspension diluted with Locke's solution to 1 : 200. The trypanosome suspension was then kept in a refrigerator for at least 4 hours, after which it was fixed with osmium tetroxide and centrifuged. The sediment was washed twice in distilled water, and smears were

made on clean slides. From these preparations collodion films were made either directly or after shadowing with gold, palladium or some other heavy metal, and placed on the objective grid. The structure of the flagellum was visible in those trypanosomes in which the body had disintegrated in the course of preparation, but in the intact forms no structural details could be distinguished. In unshaded preparations the flagellum appeared as a homogeneous filament, unconnected with any other parts of the body, but in shadowed preparations it was seen that the flagellum consists of a number of fibrils united to form a cable, while the undulating membrane represented a fold of the periplast, the shape of which is determined by the flagellum. The starting point of the flagellum did not appear to have any connexion with the kinetoplast, nor was there any evidence of the presence of a basal granule.

The paper is illustrated with 7 electron photomicrographs [see also this *Bulletin*, 1951, v. 48, 622].

C. A. Hoare

GLASGOW, J. P. & DUFFY, B. J. **Further Observations on the Extermination of *Glossina palpalis fuscipes* Newstead by Hand-catching.** *Bull. Entom. Res.* 1951, July, v. 42, Pt. 1, 55-63, 2 text figs. & 5 figs. on 1 pl.

The narrow water-side fly belt on the Sari river, south Kavirondo, Kenya, freed of *Glossina palpalis fuscipes* by catching with nets [this *Bulletin*, 1948, v. 45, 245] is still free after three years, but an attempt to apply the same method to another river area has failed.

The Sari river runs into the Kuja river, which flows into Lake Victoria. On the banks of the Kuja is forest, a mile and a half of which was the scene of the second experiment. This block of forest was isolated in 1945 and 1946 by clearings, upstream 2 miles long, costing 16,125 men-days, and down-stream, $3\frac{1}{2}$ miles, at a cost of 12,372 men-days. An average of 217 men-days per month were spent in maintaining the upper clearing in 1947 and 165 men-days on that of the lower clearing. Costs of making motor tracks and labour camps and of African supervision are not included in these figures. No increase in the rate of erosion was noticed over two years. A similar block of forest was used as a control where the standard fly round was employed from July 1946 to April 1949.

The catchers were in teams of two, 26 teams working each day in two shifts, from 7 a.m. to 3 p.m. and from 11 a.m. to dusk. Catching began in August 1946 but after 48 weeks it was obvious that no further reduction in the numbers of *G. palpalis* was being obtained. When the land catches were compared with those made from a boat, the results showed that, though the boat held only two catchers, they caught twice as many flies as four catchers on land in the same section. Two canoes continued to take more flies than the land catchers.

The second phase of the experiment then began in June 1947, when 16 punts, each holding two men, were employed and the land catchers worked only around ponds and tributaries. However, flies were obviously crossing the clearings into the forest block and after several unsuccessful attempts to stop this, the experiment was discontinued.

Catching tsetse from vertical grass and hessian screens erected at different places revealed the route by which the flies were entering the block; so, finally, 200 horizontal screens were placed at intervals of 5 yards and treated fortnightly with DDT, but they failed to reduce the catches within the block. It is thought that the 20-foot-high banks of the Kuja river may encourage the movements of *G. palpalis*.

During the course of this work, two marked flies were recovered 9 miles from the release point, but if they had followed the water the distance travelled might be as much as 13 miles.

H. S. Leeson

GUIMARAES, J. L. & LOURIE, E. M. **The Inhibition of some Pharmacological Actions of Pentamidine by Suramin.** *Brit. J. Pharmacol. & Chemotherapy*. 1951, Sept., v. 6, No. 3, 514-30, 13 figs. [14 refs.]

Transient but alarming symptoms have been reported by various authors in man and animals when aromatic diamidines were given intravenously, the chief being a marked fall in blood pressure probably as the result of peripheral vasodilatation caused by the liberation of histamine. It had previously been observed by one of the authors that a precipitate may occur when dilute solutions of pentamidine and suramin are mixed. The present investigation was undertaken to find out whether pharmacological properties of pentamidine were affected by suramin, even in absence of the formation of precipitate which occurs only within a certain range of concentration of either substance. It was established in cats that prior treatment with suramin could inhibit the fall in blood pressure normally produced by pentamidine. The broncho-constriction caused in guineapigs by pentamidine could similarly be abolished, and also when an antihistamine compound was given, thus pointing to the fact that the actions of pentamidine are probably due to release of histamine. Pentamidine acted synergically with acetylcholine whose broncho-constrictor effect was abolished by suramin. With the use of isolated gut in oxygenated Locke's solution it was found that suramin exercised an inhibitory effect on the response to histamine. Whether the anti-pentamidine action of suramin on gut, whereby contraction was abolished, is due to this antihistamine activity or the formation of a complex is not altogether clear. With a rat phrenic-nerve-diaphragm preparation it was found that pentamidine at a concentration of 1/10,000 caused a transient and slight inhibition of the muscle contraction, an effect which was abolished by suramin in concentration of 1/10,000. Another curare-like property of pentamidine was the production of paralysis in the frog when the drug was injected into the ventral lymph sac, an effect also prevented by suramin. This latter drug also delayed or abolished the effect of lethal doses of pentamidine for mice when given intraperitoneally. The authors point out that in frogs and mice the explanation of the effects obtained does not lie in the antihistamine effect of suramin since these animals are somewhat insensitive to histamine. They conclude that the inhibitory effects of suramin are due to the formation of an inactive salt complex with the amidine, with the probability that the antihistamine effect of suramin may contribute to some of the results obtained. The investigation on possible chemotherapeutic interference between pentamidine and suramin is projected.

J. D. Fulton

ELKELES, G. **On the Life Cycle of *Trypanosoma cruzi*.** *J. Parasitology*. 1951, Aug., v. 37, No. 4, 379-86, 5 figs. on pl. [20 refs.]

In this paper the author returns to a theme which he has developed in previous papers [this *Bulletin*, 1945, v. 42, 872]. He believes that in the vertebrate and invertebrate hosts, as well as in cultures, the trypanosome stages of *Trypanosoma cruzi* do not arise from a crithidial stage but directly from rounded leishmanial forms, whereas the crithidias do not represent a necessary stage of development but may be produced from trypanosomes by a forward migration of the kinetoplast. One of the arguments against the development of trypanosomes from crithidias is the scarcity of the latter in organs of the vertebrate, which is contrasted with the abundance of leishmanial and trypanosome forms. Furthermore, it is stated that "There exist, in fact, a few references to crithidia in vertebrates in the literature, but it was shown (Elkeles, 1944) that all of them are insufficiently proved". [It would thus seem that the author denies the

well-known fact that in *T. lewisi*, *T. theileri*, and some other species of the same group, the blood forms normally reproduce in the *crithidial* stage.]

According to the author, in cultures of *T. cruzi* trypanosomes are produced in the sediment, which consists of clumps of blood corpuscles, debris and flagellates, representing the "hatching places" of the trypanosomes. In this situation small trypanosomes are said to develop directly from "minute round bodies composed of larger and smaller pairs of nuclei, frequently without visible cytoplasm, like diplococci", which are described as "elementary pairs of nuclei" [?]. These round bodies, in their turn, originate from large crithidias by multiple division of the nucleus of the latter. In addition to this development, trypanosome forms may also arise from small "microleishmanias", produced by multiple division of large leishmanial forms. But apparently multiple division is not indispensable for the development of trypanosomes from the "pre-stages", for it is suggested that there might be other mechanisms by which they are produced from leishmanias. The various stages of development of *T. cruzi* are somewhat indistinctly depicted in a plate, which includes a number of figures showing the transformation of leishmanias into trypanosomes by "un-rolling" of their body [as also described by WOOD, this *Bulletin*, 1951, v. 48, 793].

[The author takes the reviewer to task for having "completely misunderstood" the findings reported in his earlier paper (this *Bulletin*, 1945, v. 42, 872). However, the reviewer has to confess that, after a careful perusal of the present paper, he has again failed to obtain a clear picture of the phenomena described and can only repeat most of the remarks made previously (*loc. cit.*). It would also seem that the author himself is not quite sure of his ground, for the views expressed by him are qualified as assumptions, beliefs or suppositions.]

C. A. Hoare

PEDREIRA DE FREITAS, J. L. Observações sobre a estabilidade de antígenos de culturas de *Trypanosoma cruzi* para reações de fixação do complemento.

[**The Stability of Antigens of *Trypanosoma cruzi* for the Complement-Fixation Reaction**] *Hospital*. Rio de Janeiro. 1950, Oct., v. 38, No. 4, 513-19. English summary.

When carrying out complement-fixation tests for Chagas's disease with an antigen of *Trypanosoma cruzi* prepared according to DAVIS's technique [this *Bulletin*, 1943, v. 40, 890], the author found that—contrary to Davis's own experience—it lost its potency after having been kept in a refrigerator for 4 months. In the present paper a description is given of an improved method of preparation of the antigen, which remained stable and invariably produced specific complement fixation for 19 months. For this purpose, the trypanosome culture was desiccated at a low temperature and kept *in vacuo* in sealed ampoules, either at -30°C . or near $+5^{\circ}\text{C}$. for 6-8 months.

C. A. Hoare

BETTINOTTI, C. M. Estudio "in Vitro" de la acción de seis antibióticos sobre el *Trypanosoma cruzi* [*In vitro Study of the Action of Antibiotics on *Trypanosoma cruzi**] *Semana Méd.* 1951, Oct. 4, v. 99, No. 14, 617-23, 3 figs. [28 refs.]

Two series of tests were undertaken to determine (i) the inhibitory potency, (ii) the trypanocidal or trypanolytic potency of six antibiotics, *viz.*, terramycin, aureomycin, chloromycetin, PAS, streptomycin and penicillin and various combinations of these. The strain of *T. cruzi* used had been isolated from a human patient and passed 5 times through white mice and 5 times in a modified

Kelser medium, described in detail in the text. In tubes of this medium were placed 3-day-old cultures of the trypanosome and then there were added different concentrations of the antibiotics in 1 ml. of glucose broth. Incubation was at 28°C. and counts were made daily. By comparison with control tubes the concentration needed to inhibit 50 per cent. of the trypanosome was observed and also that which resulted in destruction or lysis of it. Death was deduced from cessation of movement and lysis by the proportion disappearing. The counting was made by transferring a loopful (4 mm. in diameter) to a slide and using a coverglass 18×18 mm. and a magnification of 360 diameters. Four counts were made, two vertical and two horizontal, midway between the centre and edge of the preparation. The results of the *in vitro* action of the antibiotics were not very good. None of them, singly, inhibited in any of the concentrations tried, up to 400 mgm. per ml. The best was a mixture of terramycin and chloromycetin, 40 mgm. of each per ml., which inhibited 50 per cent. on the second day; next came terramycin in a concentration of 190 mgm. per ml. After the second day there was a diminution till the action ceased altogether. But—and this was a difficulty in interpretation—the results varied appreciably when tests were repeated under apparently the same conditions. The terramycin and chloromycetin seemed to have “a synergistic rather than an additive action”. Again, some of the antibiotics seemed to have an early inhibitive action, while others did not act until later on.

To have a trypanocidal action the combined terramycin and chloromycetin had to be in a concentration of 200 mgm. of each per ml. to act in 2 days; 100 mgm. of each took 4 days, and 20 mgm. of each per ml. took 8 days—concentrations higher than is ordinarily obtained in the blood of patients. The results depended not only on the concentration of the drug but also on the concentration of the trypanosomes. That used in these tests was, at the moment of sowing, 150,000 per ml.

H. Harold Scott

JARPA, A., AGOSIN, M., CHRISTEN, R. & ATIAS, A. V. Ensayos de quimioterapia de la enfermedad de Chagas experimental. VII.—Cortisona y Fosfato de Pentaquina. [**Trial of Cortisone and Pentaquine Phosphate in Experimental Chagas's Disease**] *Bol. Informaciones Parasitarias Chilenas*. 1951, Apr.—June, v. 6, No. 2, 25–7. [11 refs.]

The English summary appended to the paper is as follows :—

“The authors have tested the action of Cortisone Acetate, with or without the addition of Pentaquine Phosphate against the experimental trypanosomiasis (*Trypanosoma cruzi*) of the mice (strain DbA). The results showed a marked unfavorable effect of the hormone on the course of the experimental infection, and mice presented a high parasitemias, a quick drop on the weight curve and an increase in the mortality rate. This unfavorable effect is not controlled by the administration of Pentaquine Phosphate at the doses previously found suitable.”

CHRISTEN, R., AGOSIN, M., JARPA, A. & ATIAS, A. V. Ensayos de quimioterapia en la enfermedad de chagas experimental. VI.—Acción sinérgica de la quinina con el fosfato de pentaquina. [**Synergism between Quinine and Pentaquine Phosphate in Experimental Chagas's Disease**] *Bol. Informaciones Parasitarias Chilenas*. 1951, Apr.—June, v. 6, No. 2, 23–4.

The English summary appended to the paper is as follows :—

“The authors attempt to demonstrate a probable synergism among [between] the quinine sulphate and the pentaquine phosphate. They test the

therapeutic effect of the pentaquine phosphate alone and in combination with quinine sulphate on the experimentally induced trypanosomiasis (*T. cruzi*) of mice, strain DbA. Although both compounds were able to control the parasitemia and to prolong the survival of mice, the combination of pentaquine phosphate and quinine sulphate was more effective. Quinine sulphate alone had an unfavorable effect upon the course of the experimental disease."

RYLEY, J. F. **Studies on the Metabolism of the Protozoa. 1. Metabolism of the Parasitic Flagellate, *Trypanosoma lewisi*.** *Biochem. J.* 1951, Oct., v. 49, No. 5, 577-85, 4 figs. [22 refs.]

Previous observations by different authors on the metabolism of *T. lewisi* have indicated the importance of glucose as a substrate from which various acids are formed. Some of these results have been confirmed in the present investigation and further observations have been made on the aerobic and anaerobic utilization of this substrate. The various acid metabolic products have been quantitatively determined and the important observation has been made that the respiration of *T. lewisi* involves the cytochrome system. The effect of a number of inhibitors on respiratory metabolism has also been considered. The strain of parasite used was isolated from a wild rat and has since been maintained by passage in the laboratory species. To obtain trypanosomes free from red cells centrifugation was used and finally an agglutinating antiserum as described by MOULDER (*J. Infect. Dis.* 1948, v. 83, 33). By this means leucocytes were also removed and only a few blood platelets remained. The washed trypanosomes were suspended in glucose-salt solutions at pH 7.3 for metabolic studies, which were based on the nitrogen content of the suspensions instead of on the more usual parasite counts. Gas exchanges were measured at 37°C. in Warburg manometers, with gaseous phase of air, CO₂-O₂ or CO₂-N₂. Spectroscopic observations were made on parasite suspensions at room temperature and at that of liquid oxygen when the cytochromes were being studied. References are given for the methods used in the estimation of the different metabolites. In the aerobic experiments, respiration, which is far from negligible in absence of added substrates, was measured in the presence of a large number of such substances and it was noted that glucose, mannose, and fructose were readily oxidized, glutamine, glycerol, asparagine, and glutamic acid less readily. Although the parasites possess a lactic and succinic dehydrogenase, lactic and succinic acids, which are formed during metabolism of glucose, were not utilized by *T. lewisi*. The value of the respiratory quotient was 0.97. During the metabolism of 1 mol. glucose, 3.17 mol. oxygen were used and 1.19 mol. organic acids formed along with 3.06 mol. CO₂. The chief acid formed was acetic, along with succinate and lactate and small amounts of pyruvate. Evidence for the presence of a complete cytochrome system in *T. lewisi* was obtained, and added confirmation of its presence was provided by the light-reversible inhibition of respiration by carbon monoxide. In contrast to its lack of effect on the respiration of African trypanosomes cyanide completely inhibited that of *T. lewisi*, whereas azide exerted a much smaller effect. Other inhibitors influenced respiration in varying degrees. Under anaerobic conditions glucose was fermented and the process was stimulated by pyruvate or bicarbonate. For each molecule of the substrate approximately 2.5 molecules of the acids, described above as being present under aerobic conditions, were formed. Inhibition of metabolism by 2,2'-dipyridyl and 8-hydroxy-quinoline suggested that fermentation was dependent on an uncoordinated heavy metal, probably ferrous iron but not copper. The occurrence of a phosphorylating mechanism for carbohydrate metabolism was not established.

J. D. Fulton.

THIENPONT. Quelques observations sur l'emploi de l'Antrycide dans le traitement des trypanosomiasés bovines au Ruanda-Urundi. [**Notes on the Use of Antrycide in the Treatment of Bovine Trypanosomiasis in Ruanda-Urundi**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiasé* No. 145/0. Léopoldville (Congo Belge). [No date.] 9 mimeographed pp.

SUTER, H. Experience sur l'emploi du Pro-Salt de l'Antrycide. [**Use of the Pro-Salt of Antrycide**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiasé* No. 147/0. Léopoldville (Congo Belge). [1951.] 3 mimeographed pp.

LEISHMANIASIS

RANQUE, J., DEPIEDS, R. & CABASSU, H. Diagnostic de laboratoire du kala azar méditerranéen chez l'homme et chez le chien. Valeur comparée des divers procédés d'exploration utilisés actuellement. [**Laboratory Diagnosis of Human and Canine Kala Azar. Comparative Value of Different Procedures**] *J. Méd. de Bordeaux*. 1951, Jan., v. 128, No. 1, 262-6. [14 refs.]

The authors enumerate—and in some cases briefly describe—most of the methods used in the parasitological and serological diagnosis of Mediterranean kala azar. Among the indirect methods used in the human disease, they prefer the formol-gel reaction and MacLagan's thymol test (for the detection of hepatic insufficiency), while for the detection of the parasites examination of the bone-marrow (obtained by tibial, iliac or sternal punctures, according to the age of the patient) is recommended. In the case of canine kala azar, in the early stages, before the appearance of clinical manifestations, lymph-gland puncture is employed to reveal the parasites. In established infections, the clinical diagnosis is facilitated by the presence of characteristic dermatitis, and the parasites can be detected in smears of the cutaneous lesions after careful removal of the scales. As regards indirect methods, the best results are obtained with Napier-Gaté-Papacosta's formol reaction and Chopra's reaction, while MacLagan's test is not so satisfactory. It is noted that, in dogs, spleen and marrow punctures are difficult to perform, owing to the small size and elusiveness of the spleen, and the thickness and hardness of their bones. However, in the terminal phase of the disease the parasites in the glands, spleen and liver are lysed, and can only be detected in the bone-marrow.

C. A. Hoare

SEN GUPTA, P. C. & DAS GUPTA, C. R. **Cutaneous Lesions following Inoculation of Live Culture of *Leishmania donovani* in Man.** *Indian Med. Gaz.* 1951, Jan., v. 86, No. 1, 6.

With a view to the possible therapeutic effect, an attempt was made to induce kala azar in a patient with leukaemia. It was considered that, if the infection proved of no value, at least it would be cured easily.

A flagellate culture of *Leishmania donovani* was obtained by culture of material taken by tibia puncture from a child, and inoculations were made from the primary and secondary cultures.

Intradermal injections were given into the volar aspect of the forearm, four or five on each date, on June 2nd, 8th and 22nd; on October 3rd the patient noted small nodules at the site of the injections. The nodules increased in size; they were freely moveable on the underlying tissues and over them the epidermis was stretched and thin. They did not ulcerate.

A smear from one nodule [presumably after scarification] showed *Leishmania* and a culture was obtained.

The patient is still under observation. The authors intend to report further progress, particularly as to whether a generalized visceral disease develops.

L. E. Napier

FASAL, P. & GRADOW, A. **Intradermal Leishmanin Test (Montenegro Test) in Diagnosis of Cutaneous Leishmaniasis. Report of a Case of Chiclero Ulcer diagnosed in California.** *Arch. Dermat. & Syph.* 1951, Oct., v. 64, No. 4, 487-94, 3 figs. [Refs. in footnotes.]

"The intradermal skin test with leishmanin (Montenegro test) is a valuable addition to the various diagnostic methods available for the diagnosis of cutaneous leishmaniasis. It is specific for leishmaniasis and gives a positive reaction if the patient has or has had this disease.

"A case of chiclero ulcer (American leishmaniasis) in an El Salvadorian, observed in San Francisco, is reported. The diagnosis was based on the history, clinical findings, detection of the parasites in Giemsa-stained sections, and the positive reaction to the leishmanin skin test.

"In this case there were strongly positive reactions to leishmanin from *L. braziliensis* as well as to leishmanin from *L. tropica*. This observation gives added emphasis to the close relation, if not identity, of the two organisms.

"The leishmanin test cannot be used to differentiate different forms of leishmaniasis."

FEVERS OF THE TYPHUS GROUP

D'IGNAZIO, C. Osservazioni sulla nosografia dell'Etiopia. Le rickettsiosi umane. [Notes on the Diseases of Ethiopia. The Human Rickettsioses] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, Feb., v. 31, No. 2, 85-92.

The author reviews the contributions made by Italian workers to the knowledge of rickettsial diseases in Ethiopia. The paper deals chiefly with the fevers of the typhus group which are classified as (1) historic typhus or "the main rickettsioses" [*rickettsiosi principali*]; (2) the minor rickettsioses, which include (a) flea typhus, (b) tick typhus, and (c) mite typhus.

Historic typhus occurs throughout the areas situated at high or medium altitudes; flea typhus has been described in various localities; tick typhus of different types occurs at low or medium altitudes, and mite typhus has been reported on three occasions but the diagnosis was based chiefly on the occurrence of a Weil-Felix reaction of the OXK type.

Mention is made of a laboratory outbreak of fever caused by a pathogenic strain of *Rickettsia pediculi*.

John W. D. Megaw

LIMA, H. da R. *Rickettsia prowazeki*. Sua descoberta e caracterização constituindo um novo grupo de microrganismos. [*Rickettsia prowazeki*. Its Discovery and Characterization as the Type of a New Group of Microorganisms] *Rev. Brasileira Med.* Rio de Janeiro. 1951, May, v. 8, No. 5, 311-20. English summary. [Abstracted from English Translation received from the Author].

The author justifiably complains of the manner in which his basic discoveries in connexion with *Rickettsia prowazeki* have been belittled or ignored by many

writers during the past 35 years. He shows that till the publication of his fundamental findings in 1916 the "bodies" described by RICKETTS and WILDER in 1910 were not recognized by bacteriologists as the causal agents of typhus fever. Between 1910 and 1916, 10 "new microbes" were claimed to be the causes of the disease; these included the anaerobic "*Bacillus typhi exanthematici*" of PLOTZ *et al.*, the *Bacillus proteus* X19, and the hypothetical filtrable virus of C. NICOLLE. These were in addition to 30 microorganisms for which similar claims had been made before 1910.

He also points out that neither Ricketts and Wilder nor PROWAZEK claimed that the bodies seen by them were true causative agents; Ricketts is quoted as stating that "the grounds are not sufficient for claiming an etiological rôle on the part of the organism".

It was the author's own action in naming the organisms *Rickettsia prowazeki* in honour of the two workers who had recently died of typhus fever contracted in the course of their laboratory work that was chiefly responsible for the mistaken belief that these workers had already discovered the agent of typhus fever.

A summary is given of 14 important discoveries by the author in 1915-16; these cover most of the basic features of the organism, including its morphology, its isolation by guineapig inoculation, the preparation of a vaccine from infected lice and of a curative serum, and the creation of a new genus—the Rickettsiae. It is claimed that these findings have never been challenged and that it was only after several years that further advances were made in knowledge of the organism by WEIGL, WOLBACH, MOOSER and others.

A bitter complaint is made of the conduct of two prominent experts who are accused of having intentionally ignored his discoveries in their articles in two standard works on the rickettsiae published in the U.S.A. in 1939 and 1948. There is even a suggestion that political and cultural influences have been factors in moulding the history of scientific facts.

The distinguished writers referred to are not at all likely to have been influenced by such unworthy motives, and the author's suggestion that Ricketts did not seriously regard the "bodies" as pathogenic is not borne out by the title of Ricketts's paper in 1909 "A Microorganism which apparently has a Specific Relationship to Rocky Mountain Spotted Fever".

The fundamental importance of the author's discoveries has been widely recognized; it deserves to be universally recognized.]

John W. D. Megaw

ULEWICZ, K. Odczyny zlepane weigla i Weil-Felixa u pracowników oddzialu duru osutkowego zakadu produkcji pzh w krakowie. [Weigl's and Weil Felix Reactions in the Sera of the Persons Employed in the Typhus Department of the State Hygiene Institute in Cracow] *Med. Dośw. i Mikrob.* 1951, v. 3, No. 2, 207-32. [19 refs.]

In a lengthy paper, the author sets out the results of Weigl and Weil-Felix agglutination reactions in 171 persons, carried out in the Typhus Department of the State Institute of Hygiene in Cracow. Detailed results are shown in 17 tables.

The subjects consisted of 3 groups, namely (a) 71 members of the Department who had not been in contact with typhus rickettsiae, (b) 50 others who had been in constant contact with the rickettsiae, (c) 50 persons from outside the Institute. All the members of the Institute staff [groups (a) and (b)] had been immunized against typhus.

The highest agglutination titres in each group in respect of each of 3 organisms employed are summarized as follows :—

			<i>R. prowazeki</i>	<i>Proteus</i> <i>OX19</i>	<i>R. quintana</i> [<i>Wolhynica</i>]
Group a	...	...	1/20	1/20	1/160
Group b	...	...	1/160	1/160	1/320
Group c	...	...	1/10	1/10	1/80

In all cases, the titres were higher in “nourishers of lice”: in other persons, for example, the titres were often half of those shown above. The only exception was in the case of group (b) when *R. quintana* agglutination was employed: here the titre of 1/320 was found in the single case of one “nourisher of lice”, otherwise there was no important difference in the titres of the persons in this group.

In the control group (c) the titre of 1/10 was found in only 20 per cent. of cases in respect of *R. prowazeki* and *Proteus OX19*. In the case of *R. quintana*, although a titre of 1/80 was found occasionally, in fact it was less than 1/10 in 80 per cent. of cases.

The author considers that the resistance in typhus is due to tissue rather than humoral factors and that this cannot be determined from the height of the agglutination titres.

H. J. O'D. Burke-Gaffney

KITAOKA, M. & INOUE, H. **On the Macroscopical Rickettsia Agglutination Test on the Hollow Slide-Glass.** *Japanese Med. J.* 1950, Oct., v. 3, No. 5, 321–9. [22 refs.]

This description of yet another slide-agglutination test for typhus fever deserves attention because of the careful study that has been made of the technical details on which the reliability of such tests depends.

The method appears to combine the advantages of economy in the use of the costly antigens and accuracy in estimating the titre of the reaction.

The authors state that the rickettsia-agglutination reaction becomes positive nearly or quite as soon as the Weil-Felix test, and much sooner than the complement-fixation test.

John W. D. Megaw

KIMURA, J. **Three Cases of Typhus Fever Infection by Blood Transfusion: On a Healthy Carrier of Typhus Fever.** *Yokohama Med. Bull.* 1951, Feb., v. 2, No. 1, 19–22, 3 charts.

This is a description of an interesting incident which occurred in 1937, in Kanagawa, Japan.

Each of three persons who received 50 cc. of blood by transfusion on April 3rd from the same donor was attacked on April 14th by a fever which was clinically typical of louse-borne typhus and in which the Weil-Felix (*P. OX19*) reaction reached a titre of 1–2,000 in two cases and 1–200 on the 6th day of the third case, which was fatal. The patients lived in different localities in which no cases of typhus had been known to occur and no evidence of louse infestation could be detected among the patients.

The blood donor was a healthy student, aged 26, who till the age of 19 had lived in an island off South Korea and had not been known to suffer from any febrile illness for several years. After the incident the donor's serum reacted with the Weil-Felix test at a titre of 1–50 but not at 1–100.

An interesting feature of the incident was that one of the patients had received blood from the same donor on three previous occasions and three other persons had received 50 cc. of blood from him on March 13th, 20th, and 27th, without after-effect in any case. It appeared that the donor must have been a healthy carrier whose blood was intermittently infective.

John W. D. Megaw

NOURY, M. Sur la rapidité de diffusion des rickettsies du typhus murin chez le cobaye. [**The Speed of Diffusion of Murine-Typhus Rickettsiae in the Guinea-pig**] *C. R. Soc. Biol.* 1951, May, v. 145, Nos. 9/10, 643-4.

The author has found that murine-typhus rickettsiae can be isolated from the blood and brain of guinea-pigs as early as 10 minutes after intraperitoneal inoculation with suspensions of infected tissues. In tests carried out on 20 animals at intervals up to 72 hours after inoculation, successful isolation was effected in 19 cases, the only failure being in a blood sample taken 15 hours after inoculation.

The incubation period of the disease in the animals was, therefore, one of inapparent infection during which infectivity was constantly maintained.

John W. D. Megaw

WISSEMAN, C. L., Jr., JACKSON, Elizabeth B., HAHN, F. E., LEY, Anita C. & SMADEL, J. E. **Metabolic Studies of Rickettsiae. I. The Effects of Antimicrobial Substances and Enzyme Inhibitors on the Oxidation of Glutamate by Purified Rickettsiae.** *J. Immunology.* 1951, Aug., v. 67, No. 2, 123-36, 4 figs. on pl. [32 refs.]

Experiments on the metabolism of rickettsiae have been reported by BOVARNICK and others [this *Bulletin*, 1949, v. 46, 927; 1950, v. 47, 970]. The present investigation describes the method of preparation of active suspensions of the rickettsiae of murine typhus, their degree of purity and some of their metabolic functions. The material was grown in embryonated yolk sacs of hens' eggs which after inoculation were maintained at 35°C. for 7 to 8 days. On harvesting and homogenizing in an equal volume of sugar solution in a Waring blender a rich suspension of rickettsiae was obtained and stored at -70°C. Titrations of toxin were made in mice and complement-fixing titres of the antigen determined with the use of convalescent serum of guinea-pigs. Oxygen uptake of the suspensions was determined manometrically at pH 7.4 in an atmosphere of air at 32° to 33°C. The nitrogen content of the preparation was estimated by combustion and Nesslerization. The presence of host-cell contaminants was indicated by cytochrome oxidase activity, with the use of a spectrophotometric method; catalase and adenosinetriphosphatase were also measured. The method of purification relied largely on differential centrifugation, aided by removal of yolk sac particles by absorption on celite, by precipitation with bovine serum albumin as well as by short periods of tryptic digestion. Individual preparations varied widely in properties. The effect on glutamate metabolism was also studied of a number of substances such as chloromycetin, aureomycin and terramycin, which are active clinically in the disease, as well as of certain enzyme inhibitors, such as cyanide, azide and others. It was found that a rough correlation existed between the nitrogen content of the purified suspension and the amount of complement-fixing antigen, toxin titre and rate of oxidation of glutamate under optimal conditions. The cytochrome oxidase activity in the final preparations was thought to be due to the presence of yolk sac particles. Catalase and

adenosinetriphosphatase activity also persisted. The metabolism of glutamate was not affected by the antibiotics named, but was affected by cyanide, arsenite and other enzyme inhibitors.

J. D. Fulton

AUDY, J. R., HARRISON, J. L. & WYATT-SMITH, J. **A Survey of Jarak Island, Straits of Malacca.** With a Note on the Crabs by M. W. F. TWEEDIE. Reprinted from *Bull. Raffles Museum*. Singapore. 1950, Dec., No. 23, 230-61, 5 figs. & 2 pls. [19 refs.]

This is a formal report of the survey of Jarak Island carried out during a ten-day visit in January, 1950. Any readers who have not already seen the very interesting description by Audy [see this *Bulletin*, 1950, v. 47, 1076] are strongly advised to read the present report in which the three scientists concerned describe "The Vegetation", "The Animals" and "The Parasites" of this remarkable small island, whose fauna and flora have obviously been introduced during a recent geological period. The visit was made by a party from the Scrub Typhus Research Unit in Kuala Lumpur because of cases of scrub typhus which had occurred among a previous party in 1932 [*loc. cit.*].

John W. D. Megaw

BUSTAMANTE, M. E., VARELA, G. & ROCH, E. Estudio de una nueva fiebre petequial aislada en Michoacán (República Mexicana) del *Rhipicephalus sanguineus*. [A Study of a New *Rickettsia* isolated from *R. sanguineus* in Michoacán, Mexico] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1947, v. 8, No. 3, 163-74, 1 map & 1 graph. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, Aug., v. 39, Pt. 8, 130-31.]

The following is based on the authors' summary. In the course of a survey of rickettsial diseases in Mexico, a suspension of a batch of *Rhipicephalus sanguineus* (Latr.) taken in a house in Morelia, Michoacán, in which a man had died of a spotted fever, proved pathogenic to guineapigs, producing in them a clinical picture resembling Rocky Mountain spotted fever. It is concluded from the presence of rickettsiform elements in the tunica vaginalis of the affected guineapigs and in chick-embryo cultures, the negative results of cross-immunity tests with two strains of murine typhus and two of Rocky Mountain spotted fever (one from man in Sonora and the other from *R. sanguineus* in Morelia, Nuevo León), and the negative results of complement-fixation tests with epidemic and murine typhus, Rocky Mountain spotted fever and rickettsialpox that a type of rickettsia is involved that is different from those commonly transmitted by ticks. The name Michoacán fever is suggested for fever caused by it. It is not known whether it occurs in man.

KAUSCHE, G. A. & SHERIS, E. Zur Morphologie der *Rickettsia burneti*. [The Morphology of *Rickettsia burneti*] *Ztschr. f. Hyg. u. Infektionskr.* 1951, Aug. 23, v. 133, No. 2, 148-59, 28 figs. [27 refs.]

This description of the morphology of *Rickettsia burneti* is well illustrated by photomicrographs of which 8 are of the usual kind, 1 is taken by ultra-violet illumination and 19 are electron-microscope photographs at magnifications of 22,000 to 30,000 diameters.

Strains from widely separated parts of the world were studied; the "Nine-Mile" strain and South German strains were found to be essentially similar

in shape and size, though the former had been maintained through 4,000 yolk-sac passages and the latter had been recently isolated.

The serological properties of the strains were also similar so that it seemed justifiable to regard the organisms as belonging to the same basic species which the authors call *Rickettsia burneti*, var. *henzerling*.

The possible significance of the polymorphism of rickettsiae is discussed, but no definite conclusion is reached on the subject. *John W. D. Megaw*

STEINMANN, J. Diagnostic d'un cas de fièvre Q par l'examen cytologique des expectorations. [**The Diagnosis of a Case of Q Fever by Cytological Examination of the Sputum**] *Ann. Inst. Pasteur*. 1951, July, v. 81, No. 1, 109-11, 1 fig.

In smears of muco-purulent sputum taken on the 10th and 14th days of an attack of Q fever the author found in the macrophage cells clusters of irregular granules, sometimes in short filaments, in the protoplasm of the cells. The granules were close to the nuclei but it was not possible to determine whether they were intranuclear or not. A few of the granules were seen inside small vacuoles in the cells.

A photomicrograph illustrates the paper but the definition is not sharp enough to carry conviction with regard to the rickettsial nature of the granules. The original film stained by the May-Grünwald-Giemsa method was doubtless more satisfactory. *John W. D. Megaw*

CLARK, W. H., LENNETTE, E. H., RAILSBACK, O. C. & ROMER, Mary S. **Q Fever in California. VII. Clinical Features in One Hundred Eighty Cases.** *Arch. Intern. Med.* 1951, Aug., v. 88, No. 2, 155-67, 3 figs. [Refs. in footnotes.]

Although no death occurred among the 180 patients whose attacks of Q fever were studied, the average severity of the illness is believed to have been greater than it would have been in a series of consecutive cases in the affected area.

The percentage incidence of the chief features was as follows :—sudden onset, 72 ; gradual onset, 28 ; chills with rigor, 74 ; a feeling of chilliness in every case ; profuse sweating, 37 ; headache, usually very severe, 65 ; muscular aching, 47 ; malaise, 100 ; cough, usually dry, 24 ; pain in the chest, 10 ; crepitant râles 21 ; dullness on percussion, 3 ; anorexia, 43 ; nausea, 22 ; vomiting, 13 ; enlargement of the liver, 11, tenderness of the liver, 7 ; jaundice, 5 ; rash, evanescent and varied in type, 4.

Among 65 patients examined by X-rays, 28 per cent. had infiltrative lesions of some kind ; nearly all were in the lower lobes.

Among 102 patients whose sera were tested by the Kolmer method for syphilis, 6.8 per cent. gave a positive reaction at some time ; all became negative after clinical recovery. Either complement-fixing or rickettsia-agglutinating antibodies were present in every case ; the titre rose to 1-256 in all but a few cases. The lowest titre regarded as significant was 1-32.

The median duration of the fever was 12.5 days ; it was lower in young patients, among 39 out of 57 under 30 years old the range was 1 to 7 days and in 41 of 82 patients aged 40 years and over it was 22 to 43 days. After prolonged attacks there was often weakness and depression for considerable periods.

Most of the severe attacks were treated with aureomycin for variable periods, in daily doses of 2.0 to 4.0 gm. ; the response was "generally minimal or completely absent". *John W. D. Megaw*

JACKSON, Elizabeth B. **Comparative Efficacy of Several Antibiotics on Experimental Rickettsial Infections in Embryonated Eggs.** *Antibiotics & Chemotherapy*. 1951, July, v. 1, No. 4, 231-41, 2 figs. [40 refs.]

This paper, from the Army Medical Service Graduate School, Washington, briefly reports a comprehensive study of the action of 8 chemotherapeutic agents on 9 species of *Rickettsia*. Eggs after 6-7 days' incubation were inoculated into the yolk sac, different doses of the drug being injected by the same route less than an hour later: the results were judged by the degree of prolongation of life of the embryo. Full data for all or most of the drugs are presented (graphically) only in connexion with *R. rickettsi* and *R. orientalis*: in terms of the dose required to ensure survival for a given time, terramycin was the most effective, aureomycin being next and chloramphenicol third. A detailed comparison of the two latter in their action on 6 species of *Rickettsia* is also presented in a table, showing that about twice the dose of chloramphenicol is required to produce the effect given by aureomycin. The general order of activity of the remaining and much less effective drugs tested was *p*-aminobenzoic acid (most active), nitroacridine, penicillin G, subtilin and streptomycin, but certain differences from this were observed among individual rickettsiae. It is pointed out that results in eggs will not necessarily be paralleled exactly by those of clinical use.

L. P. Garrod

RABIES

REAGAN, R. L., LINEWEAVER, H. Odette, SCHENCK, Dorothy M. & BRUECKNER, A. L. **Studies of Rabies Street Virus in the Syrian Hamster.** *J. Bacteriology*. 1951, Oct., v. 62, No. 4, 391-3.

"A strain of rabies virus isolated from a dog brain and passaged 3 times in Swiss albino mice has been successfully transmitted to the Syrian hamster for one passage using the following routes of exposure: intracerebral, intraperitoneal, intradermal, intravenous, intratesticular, intramuscular, rectal, intranasal, and intralingual. The virus was carried for 5 serial passages by intracerebral inoculation and for 3 passages by intranasal instillation. Serial passage was not attempted by the other routes of exposure.

"This strain of virus, which had produced paralytic rabies in mice, generally produced furious rabies in the hamsters."

CAMPILLO SÁINZ, C., ROCH UBIRÍA, E. & PIZARRO SUÁREZ, Enriqueta. La aureomicina en el tratamiento de la rabia experimental del ratón. [**Aureomycin in the Treatment of Experimental Rabies in Rats**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 145-7.

The English summary appended to the paper is as follows:—

"Two tests were carried out to evaluate the effect of aureomycin on mice experimental rabies. In the first one, aureomycin was given subcutaneously at daily dose of 100 mgm. per kilo of body weight. This dose is proportionally four times higher than that recommended as treatment of several human infections.

"A dose of 125 mgm. per kilo and per day, by intraperitoneal route, was employed in the second test.

"Eaton (1950), working on the action of aureomycin on primary atypical pneumonia of the cotton rat, was able to determine the minimal effective dose. Following the same method, we used in the second test more than ten of these minimal effective doses.

"The same virus strain was inoculated by the intracerebral route in the first test and subcutaneously in the second. In both instances the treatment started immediately after inoculation and it was concluded ten days after.

"Aureomycin failed in both tests."

BANIČ, S. O mehanizmu antirabične imunosti in predlog za modificirano aplikacijo Hemptove vakcine. [**On the Mechanism of Antirabies Immunity and a Proposal for a Modified Application of Hempt's Vaccine**] *Zdravstveni Vestnik*. Ljubljana. 1951, v. 20, Nos. 9/10, 201-6. [13 refs.]

The English summary appended to the paper is as follows :—

"Laboratory animals which had been inoculated once with a great quantity of Hempt's vaccine without phenol (rats with 8-10 cc, mice with 2 cc) were injected by virus fixe 2, 4, 6 or 8 days later. The inoculated animals perished at the rate of 73.33, and the control animals at 100 percent. Concerning these results, the author states that phenomenon of interference, if existing at all, be not essential for the antirabies immunity else the animals ought to become immune a few days after having been inoculated with the great quantity of the vaccine.

"The author does not agree with Nikolić's proposal that persons bitten by wolves should be given the whole quantity of Hempt's vaccine at once.

"The author suggests that Hempt's method of vaccination should be modified. The first day of the vaccination should be performed with 10 cc of the vaccine in order to increase the antigen stimulation at the very beginning of the vaccination. The next four days running 5 cc of the vaccine should be injected, on the sixth day the injection should be omitted. The revaccination should take place on the fourteenth day from the last injection because by that time the revaccination would be already acting as a secondary stimulus and so it would be greatly increasing the immunity. It is too late to revaccinate after a month's period since the last injection took place as the incubation appears to be shorter with most people having been taken ill in spite of the vaccination."

PLAGUE

SEAL, S. C. **Studies on the Specific Soluble Protein of *Pasteurella pestis* and Allied Organisms. I. Isolation, Fractionation and certain Physical, Chemical and Serological Properties.** *J. Immunology*. 1951, Aug., v. 67, No. 2, 93-108. [17 refs.]

The author describes the isolation of the soluble proteins of virulent and avirulent plague bacilli and of pseudotuberculosis bacilli from filtrates of the growth of the organisms on his own casein hydrolysate broth medium [see this *Bulletin*, 1951, v. 48, 985]. The cultures were grown at 28°C. for 24 days, and five fractions were isolated from the filtrates by differential precipitation with progressively increasing strengths of sodium sulphate. The fractions obtained by one-third saturation ($P\frac{1}{3}$) were the most active serologically. After removing these the additional fractions obtained by one-half saturation ($P\frac{1}{2}-\frac{1}{3}$) had some degree of activity, but the fractions still remaining were serologically inactive.

Similar active fractions were isolated from the water-soluble extracts of cultures of virulent plague bacilli grown at 37°C. for 72 hours on the author's casein hydrolysate agar medium [see this *Bulletin*, 1951, v. 48, 985]. In this case the P $\frac{1}{2}$ fraction was highly active; it reacted with anti-plague horse serum at titres as high as 1-1,280,000. This fraction was practically absent from cultures of avirulent non-protective strains of *P. pestis* and was completely absent from *P. pseudotuberculosis* strains, but was present in avirulent protective strains of *P. pestis* and was regarded as the specific antigen of virulent plague bacilli. The antigens remaining after removal of the P $\frac{1}{2}$ fraction of virulent and avirulent protective strains and the P $\frac{1}{2}$ fractions of non-protective plague bacilli and pseudotuberculosis bacilli resembled each other and were non-specific; they were regarded as somatic antigens possessed in common by all plague bacilli and by pseudotuberculosis bacilli.

It was found that when virulent plague bacilli were grown through repeated subcultures on ordinary media they progressively lost the specific antigen; for the isolation of this a fully nutritive medium such as the enriched casein hydrolysate medium had to be employed.

Workers interested in the preparation of plague vaccines will wish to read the original paper.

John W. D. Megaw

SEAL, S. C. **Isolation of an Active Polysaccharide Fraction from Plague Organisms.** *Proc. Soc. Exper. Biol. & Med.* 1951, Aug., v. 77, No. 4, 675-7, 1 fig.

The author describes the isolation of an active specific polysaccharide from the specific soluble proteins referred to in the preceding paper, and also from the supernatant fluid of casein hydrolysate broth cultures of various strains of plague bacilli. From this polysaccharide crystals were prepared which resembled arabinose osazone in appearance and melting point. This observation is regarded as supporting the view that the protective substance of plague bacilli is a polysaccharide-protein complex, probably a nucleoprotein.

Details of the methods employed will be found in the paper.

John W. D. Megaw

HARADA, F., MIYAGAWA, F., SUKEGAWA, N., TUBOI, T. & NOZAWA, R. **A Survey of Rats and Rat-Fleas in Yokohama and Kawasaki Cities.** *Yokohama Med. Bull.* 1951, Feb., v. 2, No. 1, 23-34, 3 figs. [16 refs.]

Full details are given of the findings in three surveys of rats and their ectoparasites in different areas of the Yokohama region.

In the storage buildings of the Port of Yokohama the survey was carried out during the 12 months ending January 1949. In this 430 rats were caught and 84.2 per cent. of these were *R. norvegicus*. Among 729 fleas found on the rats only one *Xenopsylla cheopis* was found.

In striking contrast were the findings in the Kawasaki Steel Tube Works where a survey lasting 13 days in August, 1947, yielded 173 rats of which 63 per cent. were *R. r. alexandrinus*, and among 352 fleas 93.5 per cent. were *X. cheopis*.

In a survey of dwellings in Yokohama City during the five months ending August, 1948, only 27 rats were caught, and of these, 22 (81.5 per cent.) were *R. r. alexandrinus*. Among the 30 fleas found on the rats there was not a single *X. cheopis*.

A summary is given of the results of previous surveys of rats and their parasites in Japan; it appears from this that *X. cheopis* is absent or scanty in most

of the Japanese cities ; the highest previous record was 8.5 per cent. in Yokohama City during 1913-14 ; but in a survey of this city in 1908-9 the percentage was 0.3. The remarkable prevalence of this species in the Kawasaki Works will be further studied.

John W. D. Megaw

SIMON, R. Verificação da sensibilidade dos roedores da região neotropical. [A Study of the Susceptibility to Plague of the Rodents of the Neotropical Region] *Monografias do Serviço Nacional de Peste*, 3. [Brasil] 69 pp., numerous figs. [13 refs.] 1951. Rio de Janeiro.

The first part of this booklet of 69 pages contains a brief description of the zoogeography of Brazil with special reference to the rodents, of which there are no less than 200 species in that country.

The second, and larger, part consists of a description of an experimental study of the susceptibility to plague of certain rodents and of the pathological anatomy of the infected animals.

There are 38 illustrations including 6 maps, 6 photographs, 6 good semi-diagrammatic line drawings, a coloured drawing and 18 photomicrographs indifferently reproduced.

John W. D. Megaw

CHOLERA

SWAROOP, S. & RAMAN, M. V. **Endemicity of Cholera in relation to Fairs and Festivals in India.** *Indian J. Med. Res.* 1951, Jan., v. 39, No. 1, 41-9, 5 maps.

A study was made on the distribution of cholera in India for the purpose of ascertaining whether the occurrence of fairs and festivals in different regions played a part in the endemicity of the disease. It is, of course, recognized that fairs play an important part in the spread of infection and form the starting points for epidemics. Certain factors in relation to this are discussed.

An analysis of the relative information was made in the basis of a series of maps showing the recognized endemic areas and the degree of cholera endemicity in different regions, in relation to the location of festival centres. An estimate of the magnitude of each fair was made on the basis of "person-days" of exposure to conditions in each centre, by multiplying the average attendance by the total number of days for which the fair is held. Of the total of 24 centres showing more than 2 million "person-days" 60 per cent. were found to be outside the endemic areas. Of 280 centres with attendances between 100,000 and one million "person-days" 70 per cent. were also outside the endemic zones. No evidence was obtained that the level of endemicity is high around each pilgrim centre. Detailed consideration is given to certain important pilgrim areas and it is found that in relation to many of them of perennial importance, in spite of major cholera epidemics arising from the centres, infection does not persist materially in the neighbourhood. The conclusion is drawn that an explanation for endemicity of the disease must be sought elsewhere than in the occurrence of fairs and festivals.

J. Taylor

BANERJEA, A. C. **Note on Cholera in the United Provinces (Uttar Pradesh).** *Indian J. Med. Res.* 1951, Jan., v. 39, No. 1, 17-40, 6 graphs and 1 map. [16 refs.]

The incidence of cholera in the United Provinces (Uttar Pradesh), India, and factors affecting it are discussed on the basis of the figures of a 72-year

period (1877-1948) during which 3,778,225 deaths from cholera occurred in the province with an average annual figure of 52,475 deaths.

Epidemics in the province are mostly connected with the large fairs and festivals which are held on the banks of the rivers to which pilgrims come from all over India. These form the starting points for outbreaks.

Even on five-year averages there are wide fluctuations in the number of deaths and the death-rate from cholera. The explosive epidemics of the earlier years of the period are, however, now less frequent and on the whole there has been a considerable reduction in incidence since 1922. Highest incidence is during the months from May to October and during January, February and March incidence is negligible. The seasonal incidence follows the absolute humidity curve. The incidence of cholera in the 49 districts of the province has been analysed and is shown on a map.

The question of endemicity of cholera in the province is discussed in relation to the criteria taken for this in India. The opinion is expressed that—"In all probability it will be found that the conclusion that there is no *true endemic* focus of cholera in the U.P. (like the type existing in well-recognized endemic areas) reached by Saranjan Khan after his field study, which is also the opinion of every experienced public health worker in the province, will stand the tests of any field investigation".

The influence of fairs and festivals on the occurrence of epidemics is discussed in some detail. Annually about 400 fairs are held which are attended by over 12 million persons. Of these 116 are held in the months of March and April when meteorological conditions begin to become favourable to the spread of cholera. Every third year specially large fairs are held either at Allahabad or Hardwar with attendances up to 3 million and 1½ million at the respective centres. A close relationship between these fairs and cholera epidemics is shown.

Indirect compulsory inoculation with cholera vaccine was first introduced on the occasion of the Ardh-Kumbh fair at Hardwar in 1945, entry to the fair being prohibited to pilgrims not holding a certificate of inoculation. The measure was again carried out in 1950. "All persons were prohibited from travelling by rail or roadways or on foot to Hardwar and adjoining stations and within a radius of ten miles from 14th March to 13th April, 1950, unless holding a certificate of inoculation. Railway and bus tickets were dependent on the production of the inoculation certificate. There was a gathering of some 1·2 million on 13th April, 1950, the main day of the fair. Over one million anti-cholera inoculations were given to the pilgrims in the districts all over the province and at various posts and barriers. At barriers alone 211,224 inoculations were given. Eleven cases of cholera, all imported, were promptly detected and isolated. There were no secondary cases."

An account is given of the general organization for control of cholera in the province. [This will be of considerable interest to those concerned with public health measures against epidemic diseases in the tropics.]

It is recognized that most of the anti-cholera measures at present taken are of a temporary nature and that improvements in environmental hygiene are necessary to provide the community with lasting protection. The primary requirements are protected water supplies in every village and efficient methods for the disposal of refuse and night-soil. Such measures are specially required in the endemic areas of cholera which form the reservoir of infection and these should be given priority.

[The reviewer has emphasized this on many occasions. There is an ever-present threat of introduction of cholera from the comparatively limited areas where the disease is endemic to other parts of India. If cholera can be dealt

with effectively in the endemic areas there will be no need to maintain large provincial organizations to combat it at heavy expense. The endemic centres constitute a danger to world health.]

J. Taylor

FELSENFELD, O., SOMAN, D. W., WATERS, THORA & ISHIHARA, S. J. **Studies on Recently Isolated Cholera Vibrios. Re-Evaluation of Culture Methods.** *J. Bacteriology*. 1951, Aug., v. 62, No. 2, 175-80.

Studies were carried out on the value of different media for isolation and growth of *V. cholerae* and for its preservation. First tests for growth were made with a simple peptone-salt solution at pH 7.8 to 8.0, different peptones being used. The heaviest growth was obtained with Difco peptone and this was used in subsequent tests.

The average multiplication rate of the vibrios was tested in a number of fluid media inoculated with a mixed inoculum of *V. cholerae* and other intestinal organisms. The heaviest growth was obtained in alkaline peptone broth, GOHAR's medium also giving a growth which was nearly equal. Good growth was also obtained in VENKATRAMAN and RAMAKRISHNAN's medium (sea-salt mixture with a boric-acid-potassium-chloride buffer at pH 9.2) and in selenite-F broth at pH 7.8 to 8.0.

The value of different plating media for isolation was also tested, those used being the media of Dieudonné, Krumwiede, Aronson, Wilson and Reilly, Teague, and Panja and Ghosh. Details of the composition of some of the media are given.

With the use of mixed inocula with an average of 5 to 10 viable *V. cholerae* a statistical evaluation of the results showed that—"The fiducial limit of 90 per cent probability of isolation was exceeded by plain alkaline agar, and by Aronson's, and Panja and Ghosh's media".

On the basis of the results the procedure for isolation of cholera vibrios recommended consists of :—

- "(a) Streaking of two plates each of alkaline agar and Aronson's medium directly with stools.
- "(b) Inoculation of one tube each of alkaline Selenite-F, and Gohar's alkaline peptone broth with the feces.
- "(c) Incubation of the plates and tubes for 24 hours.
- "(d) On the second day, streaking from the tubes to one alkaline agar plate and Aronson's medium."

The survival time of *V. cholerae*, whether in pure culture or in mixture with other intestinal organisms, was determined in several preserving fluids at 22° and 26°C. Longest survival was found in alkaline peptone broth, alkaline selenite-F medium, Venkatraman and Ramakrishnan's fluid and Gohar's alkaline broth with potassium tellurite.

J. Taylor

MINCK, R. & MINCK, A. Obtention de formes naines (formes L) à partir d'une souche de vibron cholérique soumise à l'action de la pénicilline. [**Dwarf (L) Forms of *V. cholerae* Obtained From a Strain Subjected to the Action of Penicillin**] *C. R. Soc. Biol.* 1951, June, v. 145, Nos. 11/12, 927-9.

Dwarf forms, similar to the L forms which have been described in the case of other organisms, have been obtained from cultures of *V. cholerae*. These were not produced by subculture of stock strains on horse serum agar to which

1,000 units penicillin per ml. had been added, except when the inoculum was made from the peritoneal exudate in mice after infection with a virulent strain.

Characteristic microcolonies of two types were obtained ; a smaller one with a diameter of 125 to 200 μ which was pale in colour, and had little tendency to give rise to normal colonies, and a larger one of 500 μ which tended to develop a yellow or brown colour and readily produced normal colonies on prolonged incubation. The microcolonies derived from *V. cholerae* were very similar to those of other organisms. They were transferable in series without change, in the medium containing penicillin, but reverted to normal form when the penicillin was omitted.

The antigenic structure of the L forms appeared to be little different from that of the normal form of the vibrio. This point is being further studied. The L forms derived from virulent strains were completely non-pathogenic to animals, but normal forms obtained by reversion from the L form showed their original virulence.

Inoculation with suspensions of the dwarf forms appeared to produce a certain degree of immunity against the virulent form of *V. cholerae*.

J. Taylor

OLEJNIK, E. & DAVIDOVITCH, S. **Action of Terramycin and Chloromycetin on Cholera Vibrio in Mice.** [Correspondence.] *Nature*. 1951, Oct. 13, 654.

For these tests, four strains of *V. cholerae* were used, Ogawa 41, Inaba 35 and 29 and a Mediterranean Inaba strain. Ten to 20 mice in each series were inoculated intraperitoneally with a suspension of 1 ml. of an 18-hour culture : the suspension contained 50×10^6 organisms per ml. and 5 per cent. mucin. The inoculations were fatal in 48 hours. The antibiotics were given intra-peritoneally in single graduated doses half an hour and 5 hours after infection.

The results were as follows :—

Terramycin						
				After $\frac{1}{2}$ hour dose mgm./kgm.	Per cent. survival	After 5 hours mgm./kgm.
						Per cent. survival
A.	Inaba 35	...	...	5-10	100	15
B.	Inaba 29	...	...	5-10	100	30
C.	Inaba, Med.	...	...	5-10	100	30
D.	Ogawa 41	...	...	15	100	30

Chloromycetin						
A.	Inaba 35	...	...	25	100	250
B.	Inaba 29	...	...	50	100	250
C.	Inaba, Med.	...	...	50	100	250
D.	Ogawa 41	...	...	100	100	250

In the experiments with terramycin, treatment was also given 7 hours after infection with the Inaba 35 strain. Even 300 mgm./kgm. was ineffective and it would seem that 5 hours is the limit of time after infection in which terramycin is effective.

H. J. O'D. Burke-Gaffney

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

NEGhme R., A. & SILVA C., R. Nuevos estudios epidemiológicos de la amebiasis y otras enteroparasitosis en Chile. III. Comunicación. [**Fresh Studies on the Prevalence of Intestinal Parasites in Chile. Third Communication**] *Rev. Chilena Hig. y Med. Preventiva*. 1950, Sept.-Dec., v. 12, Nos. 3/4, 87-94. English summary.

[Previous reports on this subject have already been abstracted in this *Bulletin*, 1950, v. 47, 1197; see also *ibid.*, 464.] The present is a record of the authors' findings in 4,410 persons examined in zones between lat. 18° and 43°S. This region was, for purposes of description, divided into 3 zones, north, central and south. The prevalence of intestinal parasites was generally high, but varied considerably in the different zones. Taking the chief parasitic infections in order: *Entamoeba histolytica* was found in 1,254 (28.4 per cent.), but the percentages varied much. Thus, in the San Miguel district of Santiago 156 were infected among 503 examined (31.2 per cent.); in Pirque district of the same Province 157 out of 434 (36.1); in Chiloé Province only 26 among 403 (6.4), in San Felipe (Aconcagua Province) 14 out of 210 (6.6), but in Cerillos and Quinta Normal, both in Santiago Province, of 321 and 246 examined respectively there were 90 and 68 infected (28 and 27.6 per cent. respectively).

The causes of the prevalence are given as bad drinking water, from wells or springs insufficiently protected and both liable and subject to faecal pollution; open irrigation canals also soiled by excreta but nevertheless used for growing lettuces, celery, etc.; soil pollution from indiscriminate defaecation; flies with access to these sources of pollution; deplorable insanitary habits and careless handling of food. Among 42 food-handlers examined in one suburb of Santiago "34 per cent." [14 or 15?] were passing cysts of *E. histolytica*.

Entamoeba coli occurred in 60-80 per cent. and *Endolimax nana* in an average of 20 per cent. *Giardia intestinalis* infection is rife in the northern and central areas, 9 to 36 per cent., but much less in the southern where it is only 2-4 per cent.

As regards helminthic infections, *Ascaris lumbricoides* is common but, again, variable, from 252 among 403 (62.5 per cent.) in Ancud-Castro, Chiloé Province, and 257 among 503 (51 per cent.) in S. Miguel, Santiago, to 4 among 206 (1.9) in V. Lluta, Tarapacá Province. *Trichuris trichiura* was also rife: in Ancud-Castro it was found in 306 of 403 examined (75.9), in S. Miguel in 341 (67.7) and in V. Lluta 21 (10.1). In short, the incidence of these fluctuated between 6 per cent. in Valparaíso coastal regions, 51 per cent. in the southern commune of San Miguel and 62.5 in the island of Chiloé in the south. *Taenia saginata* is more commonly found than *T. solium*, but exact figures are lacking. *Hymenolepis nana* is more common than has been thought; it was found in 5-11 per cent. in the northern area, 5-21 in the central, and 2-11 in the southern. *Enterobius vermicularis* is very frequent in Chile and is to be the subject of a separate communication. Other parasites are rare. *Balantidium coli* and *Fasciola hepatica* are occasionally seen and 12 instances of infestation by *Diphyllbothrium latum* recently.

H. Harold Scott

ROSAS COSTA, G. A. Las parasitosis intestinales. Enfermedad social. [**Intestinal Parasitism; a Social Disease**] *Semana Méd.* 1951, Sept. 27 v. 99, No. 13, 570-77.

The first half of this article consists of general statements on intestinal parasitism, protozoal and helminthic, their traumatic, irritative and spoliative actions, their pathogenicity and the reaction of the hosts—information to be found in any up-to-date textbook.

The second part is of greater interest, the prevalence of parasitism among the inhabitants of Paraná, Province of Entre Ríos, Argentina. During the four years 1942-45 faecal examinations of 5,196 patients were carried out. Parasites of one kind or another were found in 3,124 (60.1 per cent.). Infection by one parasite only occurred in 1,917 (61.3 per cent. of those positive); by two parasites in 943 (30.2); 232 (7.4) had three, and one had as many as six. Protozoal parasites outnumbered helminthic by 19 to 1. *Entamoeba histolytica* was present alone in 20 per cent., in association with others in 31.1 per cent. more, *i.e.*, alone or in combination in more than half (51.1 per cent.); *E. coli* alone in 25.9 per cent. and with others in 29.9 per cent. (55.8 per cent. altogether); *Giardia intestinalis* alone in 8.7 per cent., with others in 4.6 (13.3 together); *Trichomonas intestinalis* alone in 8.4, with others in 14 (together in 22.4). Figures are also given for the year 1950 [nothing is said of the intervening years]. During that year 1,471 were examined and 799 (54.3 per cent.) were positive: 645 (80.7 per cent.) of the positive harboured a single parasite and 142 (17.7) had two. In the 1950 record, as in the earlier period, protozoal infections greatly outnumbered the helminthic. Worms found included *Taenia saginata*, *Enterobius vermicularis*, *Ascaris lumbricoides*, *Hymenolepis nana*; a few had *Trichuris* and *Strongyloides*, but there was no autochthonous case of hookworm.

Among 100 children [to what age is not stated] examined in 1945, 83 were positive; 46 harboured *E. histolytica*, 54 *E. coli*, 27 *G. intestinalis*, 18 *Trichomonas intestinalis*. Ten years earlier, in 1935, DE BERNARDI had found, among 344 examined, 80.23 per cent. positive; 23.54 per cent. had *E. histolytica*, 31.93 *E. coli*, 38.39 *G. intestinalis* and 22.38 *Trichomonas intestinalis*.

Contagion is, clearly, widespread and insidious, and is no respecter of persons, age or sex, and, though not fatal in themselves, the parasites by undermining health predispose to other diseases and this state of things calls for action.

H. Harold Scott

VANNI, V. Presencia de *Endamoeba histolytica* en las ratas de Buenos Aires. [*Endamoeba histolytica* in Wild Rats] Bol. Oficina Sanitaria Panamericana. 1951, Sept., v. 31, No. 3, 242-3.

The English summary appended to the paper is as follows:—

“Out of 1,453 wild rats (*Rattus norvegicus*) examined at the Malbrán Institute of Buenos Aires, Argentina, from March to October 1950, 19% showed in the intestine *E. histolytica* in all stages of development, including cysts. Histological examination of the mucous membrane of the intestine showed superficial localization of the parasite, causing small hemorrhages. Wild rats (*Rattus norvegicus*) fed with wheat and rice flour may therefore become a reservoir of human infection.”

LAMY, L. La culture pure des amibes parasites. [Cultivation of Parasitic Amoebae] J. Méd. de Bordeaux. 1951, Jan., v. 128, No. 1, 253-6.

The author has been engaged for some time in attempts to produce a bacteriologically pure culture of *Entamoeba histolytica*. In view of the negative results, preliminary investigations were carried out on the ability of the pathogenic reptilian parasite, *E. invadens*, to grow in pure culture. In the first place, a pure mixed culture of *E. invadens* with a single species of bacterium was obtained by isolating a single amoeba with the aid of de Fonbrune's micro-manipulator and inoculating it in Ringer-serum-rice-starch medium with

Staphylococcus aureus. The next step was the inhibition and elimination from the culture of the concomitant coccus. This was done by removing the supernatant fluid of a rich 5-day culture and replacing it by fresh fluid to which 500 units of penicillin were added; this procedure was repeated 24 hours later, after which decreasing amounts of the antibiotic were added: 200 units on the 3rd day, 100 on the 4th, followed by several score maintenance units on subsequent days. This treatment results in the gradual diminution and ultimate disappearance of the bacteria, while the amoebae, being deprived of their particulate food, also decrease in numbers and gradually perish. However, for a limited period of time there is established a bacteriologically pure culture of *E. invadens*.

These temporary pure cultures could be perpetuated in two ways: by adding to the medium (1) the ground-up organs of vipers, or (2) mashed chick-embryos 8–10 days old. The latter is the most convenient method. The mash is introduced to the bottom of the culture tube containing one of the diphasic media and rice starch. In this culture *E. invadens* develops normally, though its growth is not so rich as in mixed cultures. In addition to starch, the amoebae ingest particles of the embryonic tissue. The embryo-purée should be used fresh, but it can be preserved for months at -15°C . The duration of these pure cultures does not exceed that of mixed ones. C. A. Hoare

NAKAMURA, M. & ANDERSON, H. H. **Effect of Heat-Treatment on the Respiration of *Trypanosoma cruzi* used for the Cultivation of *Entamoeba histolytica*.** *Amer. J. Trop. Med.* 1951, July, v. 31, No. 4, 438–41, 1 fig.

In order to determine some of the factors governing the growth of *Entamoeba histolytica* in cultures with heat-treated *Trypanosoma cruzi*, the authors have studied the respiration of this trypanosome, which was cultivated in Chang's diphasic medium. For the determination of the oxygen uptake, trypanosomes from 14-day-old cultures were centrifuged and washed 4 times with saline, after which 1 ml. of a suspension containing 100 million organisms was placed in each Warburg flask, to which 0.5 ml. of a 2 per cent. glucose solution was added. The trypanosomes were heated by immersing a test tube containing 10 ml. of the saline suspension in a water bath, and the tests were made at 37.2°C . In order to study the effects of heating the trypanosomes on their ability to maintain the growth of *E. histolytica*, the amoebae were added after heat-treatment at different temperatures.

The oxygen uptake tests showed that there was a pronounced respiration with 1 ml. containing 100 million *T. cruzi*, when heated at 48°C . for 10 minutes, but no respiration when the trypanosomes were treated at 50°C . for the same period of time. After heating at these temperatures subcultures of *T. cruzi* failed to grow. *T. cruzi* promoted the growth of *E. histolytica* only after heat-treatment that rendered the trypanosomes non-viable but not after these were exposed to temperatures which inhibited their respiration. If *E. histolytica* were heated at 45, 48 and 50°C . for 10 minutes they survived in association with trypanosomes, both when these were unheated or heated at 45°C . or 48°C . for 10 minutes, but not when they were heated at 50°C . C. A. Hoare

WHEATLEY, W. B. **A Rapid Staining Procedure for Intestinal Amoebae and Flagellates.** *Amer. J. Clin. Path.* 1951, Oct., v. 21, No. 10, 990–91.

In 1950, GOMORI published a trichrome staining method (*Amer. J. Clin. Path.*, 1950, v. 20, 661) and the present author, while staining tissue from a

case of amoebiasis in this way, found that the chromatin of *E. histolytica* had an affinity for the dye chromotrope 2R.

He has utilized this finding in modifying Gomori's technique to apply it to staining intestinal amoebae and flagellates.

The original staining solution in the proportions suggested by Gomori was found to be the most satisfactory. This consists of 0.6 gm. chromotrope 2R ; 0.3 gm. light green SF ; 0.7 gm. phosphotungstic acid ; and 1 ml. of acetic acid in 100 ml. of distilled water. (The author adds that the shades of the colour scheme may be varied by the addition to the staining solution of 0.6 gm. Bismark brown, Bordeaux red, Ponceau de Xylidine or certain indicators, e.g., brom-cresol purple.)

The staining procedure is as follows :—

" 1. Make thin fecal smears and, while wet, place in Schaudinn's fixative without the acetic acid. The fixing time can be varied from 10 minutes to 48 hours, but 30 minutes to one hour has been found to produce the best results.

" 2. 70 per cent alcohol with enough iodine to produce an amber color, 2 minutes.

" 3. 70 per cent alcohol, two changes, 2 minutes each.

" 4. 50 per cent alcohol, 2 minutes

" 5. Rinse in tap water.

" 6. Staining solution, 30 minutes.

" 7. Rinse quickly in 95 per cent alcohol.

" 8. Absolute alcohol, 1 minute.

" 9. Clear in xylene, 5 minutes.

" 10. Mount in balsam."

The chromatin stains various shades of red, while cytoplasm and albuminous material take the light green or stain a very pale pink. In this way, diagnostic detail has been obtained with cysts of *E. histolytica* and *E. coli*, *I. bütschlii* and *G. intestinalis*. The staining is characteristic : for example, *E. coli* cysts show a distribution of red stain in the cytoplasm, while in the cysts of the other parasites the red stain is confined to the nucleus and chromatoid bodies.

The staining solution has also been used on tissue from a case of amoebiasis with good results. With such tissue fixed with Zenker's fluid, it has proved better to stain for 2 minutes in Weigert's haematoxylin before staining in the regular staining solution. The results are the same as with faecal smears, except that the cytoplasm stains grey or greyish green.

The method is rapid and simple in that overstaining and differentiation are not necessary, nor is a mordant required. The results are stated to be comparable with those obtained by the longer haematoxylin methods.

H. J. O'D. Burke-Gaffney

RODRÍGUEZ, C. & ADRIANZA H., M. Complicaciones pleuro-pulmonares de la amibiasis. [**Pleuro-pulmonary Complications of Amoebiasis**] *Bol. Soc. Venezolana de Cirugía*. 1950, Sept.-Oct.-Nov.-Dec., v. 3, No. 23, 251-85, 19 figs. [11 refs.]

This is of the nature of an academic study or a clinical lecture, with a presentation of 10 cases of amoebiasis with involvement of the lung or pleura or both. The authors point out that this may arise either by direct extension by the blood-vessels to the liver and thence by hepatic abscess and perforation of the pleura, setting up empyema, or by adhesions to produce the "shirt-button" abscess (*botón de camisa*), or into a bronchus producing a broncho-hepatic fistula ; or by parasitic migration *via* the trans-diaphragmatic capillaries

to produce pulmonary abscess separate from the hepatic focus. The authors propose the following classification :

I. *Pleural complications :*

- i. Pleurisy, dry or serous.
- ii. Empyema, purely amoebic.
- iii. Empyema amoebic, secondarily infected *via* the thoracic wall, as by puncture, drainage, etc., or *via* the bronchi.

II. *Pulmonary complications :*

- i. Amoebic abscess, haematogenous, solitary.
- ii. Amoebic abscess, metastatic but separate from liver abscess.
- iii. Pulmonary and hepatic (shirt-button) abscess.
- iv. Hepatic abscess perforating into a bronchus (*a*) without perifocal pulmonary reaction ; (*b*) with such reaction, specific benign amoebic or secondarily with superadded infection.

Something is said on each of the foregoing and 10 cases are then detailed. Treatment is summed up by saying that emetine is the best, with antibiotics if there is superadded secondary infection. Surgical intervention is recommended for amoebic empyema opening into a bronchus and secondarily infected ; also in chronic amoebic empyema when the lung does not re-expand ; in bronchiectases, chronic pulmonary abscess secondary to liver abscess or itself infected secondarily. A purely amoebic empyema should, they say, never be drained for fear of secondary infection or gangrene of the thoracic wall.

X-ray photographs show [but not very clearly] the conditions in some of the 10 cases detailed. [The article is mainly a summary of textbook knowledge and contains little if anything not known to readers of this *Bulletin*.]

H. Harold Scott

WANG, Wen-pin. **Amoebic Vulvitis. Report of One Case.** *Chinese Med. J.* Peking. 1951, Sept.-Oct., v. 69, Nos. 9/10, 384-7, 2 figs. on pl.

"1. A case of amoebic vulvitis is reported.

"2. The diagnosis of this condition is relatively simple if it were kept in mind.

"3. The lesion is characterized by geographic painful ulceration of the involved skin, bloody exudate and marked tenderness.

"4. Lesion responded to systemic emetine therapy very promptly."

COSTA, R. S. Parasitismo intestinal por protozoarios (amibas y flagelados) y su relación con ciertas dermatosis. [**Intestinal Protozoal Parasites and their Relation to certain Dermatoses**] *An. Inst. Hig. Montevideo*. 1950, v. 4, 17-47, 6 figs. [15 refs.]

Many authorities are of the opinion that the only pathogenic intestinal protozoon is *Entamoeba histolytica*, but the author maintains that several others—*E. coli*, *Endolimax nana*, *Dientamoeba fragilis*, *Iodamoeba bütschlii*, *Giardia intestinalis*, *Enteromonas*—may also be pathogenic and particularly in the causation of dermatoses, such as urticaria, prurigo, eczema of various forms, exudative, desquamative, keratotic, and pruritus and psoriasis. When a patient presented himself with any of these symptoms [presumably if no obvious cause was found] he was prevailed upon to pass a motion in the laboratory and the fresh stool was submitted to immediate examination and stained preparations were also made, and if any parasites were seen treatment was at once taken in hand. Notes are given of 81 patients, some notes of moderate length, many of a couple of lines only, in whom successful results followed treatment of the protozoal infection found.

H. Harold Scott

LANE, R. **The Treatment of Hepatic Amoebiasis with Chloroquine.** *J. Trop. Med. & Hyg.* 1951, Oct., v. 54, No. 10, 198-206. [50 refs.]

After a full discussion on the diagnosis and treatment of amoebiasis, the author describes a clinical trial in cases of hepatic amoebiasis.

Twenty consecutive patients were treated with chloroquine : they comprised persons of European origin as well as Armenians, Anglo-Indians, Chinese and Indians. After various trials of treatment it was decided to commence with chloroquine and then, if at the end of ten days signs were still present, to add emetine and diodoquin. The cases thus fell into three groups :—(a) those treated with chloroquine alone, (b) those treated with chloroquine after emetine, (c) those treated with the later addition of emetine. The dosage of chloroquine was 600 mgm. of the base daily for two days, 300 mgm. a day for 4 days and then 150 mgm. daily for 24 days, making a total of 40 tablets.

Diagnosis was invariably made on clinical grounds and cases tended to present themselves either as a subacute illness with sweating and high intermittent fever, or as chronic malaise.

Fever could not always be correlated with liver tenderness and one patient, for instance, in whom slight pressure on the liver produced acute pain, was afebrile.

Pain in the liver was variable : in one case any movement of the upper part of the body became very painful. Neither anorexia nor loss of weight was extreme. Bouts of flatulent dyspepsia were very common. The furring of the tongue was moist and brown, covering the entire surface with exception of the tip. Liver tenderness could usually be elicited by gentle percussion with the side of the closed fist, but usually by gently squeezing the liver between the two hands. Radiology was employed only in two cases : in one the obvious enlargement was unaccompanied by any changes in the contour of the diaphragm. In three only were there signs at the base of the right lung. Thickening and tenderness of the large intestine were regarded as confirmatory evidence of large bowel involvement.

The results of treatment were assessed by the disappearance of tenderness under 7 days, 7-14 days, or over that period, by the time taken off work, and by disappearance of abdominal signs. The results are shown in the table below.

	Chloroquine only	Chloroquine after emetine	Emetine plus chloroquine
Liver tenderness gone:			
In under 7 days	9	1*	—
7-14 days	3	1†	1
In over 14 days	—	2†	3
Time off work :			
None	5	—	1
Less than 7 days	6	1	—
7-14 days	1	3	3
Abdominal signs :			
Gone within 7 days	1	1	—
Lasted 7-14 days	3	1	2
Lasted over 14 days	—	2	2

* This patient had been treated elsewhere intermittently and the timing here is given from the commencement of the treatment with chloroquine ; in other cases in this column it is from the commencement of any treatment.

† Treatment abandoned before completion in one case.

In those characterized by an acute febrile illness with the infection apparently confined to the liver, a rapid cure was effected.

In those with bowel involvement the results were most variable; in 4 cases signs cleared rapidly with chloroquine alone, but in another 4 these persisted until emetine was added.

Toxic symptoms consisted of limb weakness, dreams, nausea, vomiting, diarrhoea and visual disturbances. Nausea and vomiting were severe in the two only. In one, after 9 grains of emetine and fourteen days of diodoquin, liver tenderness was still marked, so chloroquine was substituted.

It is suggested that only by extensive clinical trials in every area in which amoebiasis is endemic, can the proper rôle of chloroquine in treatment be discovered. The main advantage is that the treatment is simple and that it does not interfere with or prejudice the patient's employment.

Philip Manson-Bahr

PHILLIPS, B. P. **Measurements of Direct Amebicidal Potential by a Micro-Method for the Screening of Drugs in Vitro.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 561-5. [13 refs.]

The author has employed microcultures of *E. histolytica* grown in association with *T. cruzi* in the absence of bacteria [this *Bulletin*, 1950, v. 47, 624, 741] to determine the direct amoebicidal activity of 10 different substances. For this purpose each microtube was inoculated by means of a micromanipulator with a single trophic amoeba derived from a culture with a *Streptobacillus* inhibited by penicillin. Direct counts of the number of amoebae present were made through the walls of the microtube at intervals of 24, 48, and 72 hours during incubation at 37°C. The drugs used did not affect the accompanying trypanosomes as judged by morphological appearance and unimpaired motility. It was found that penicillin G, streptomycin, chloromycetin and bacitracin exerted little direct effect on *E. histolytica*. Aureomycin, terramycin and simaroubidin were amoebicidal at very low concentration. Emetine, actidione and arsenamide sodium were even more active but the author reminds us that the toxicity exhibited by these three latter substances has to be reckoned with when they are used clinically. The good agreement with the results obtained clinically emphasizes the value of this new method of *in vitro* testing.

J. D. Fulton

COSTA, R. S. Observación de dermatosis extendida (universal), de marcha crónica, causada por parasitismo intestinal de *Giardia intestinalis* o *Lamblia intestinalis* (Lambl, 1859). [**A Case of Chronic Generalized Dermatitis Caused by *Giardia intestinalis* Infection**] *An. Inst. Hig. Montevideo.* 1950, v. 4, 11-16, 1 fig.

The following is a translation of the author's summary.

The author presents a case of chronic diffuse eczema with general symptoms (intense pruritus, loss of weight, disturbance of sleep, etc.). Parasitological examination of the stools showed the presence of very many flagellates (*Giardia intestinalis*). The treatment given fully confirmed the author's view, because the patient was cured after a few days, having received 70 centigrammes of "Acranil", without any accompanying local treatment.

H. J. O'D. Burke-Gaffney

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SÉNÉCAL, J. & AHMAD, A. Considérations sur le traitement de la fièvre récurrente par la pénicilline. [**Treatment of Relapsing Fever with Penicillin**] *Semaine des Hôpit. de Paris*. 1950, May 10, v. 26, No. 35, 1634-8, 7 figs.

Relapsing fever is common in Afghanistan, and in the course of one year the authors were able to observe 100 cases. Nearly always this disease is of the louse-borne type (*Trep. recurrentis*) and often occurs in epidemics. Diagnosis is easy as the spirochaetes are found in large numbers in the peripheral blood.

This paper deals only with the effects of treatment by penicillin. Treatment up to the present has been mainly with organic arsenicals, which are very effective in the louse-borne type of disease but are not without some danger in the case of patients debilitated and in poor condition. Not long after the commencement of these observations an outbreak of relapsing fever in Kabul gaol gave an opportunity for the careful observation of 30 cases. It was possible to be certain of the time of commencement of the illness, a difficult matter in the cases seen as out-patients, while an early diagnosis by systematic and frequent blood examinations could be made. Patients were isolated in hospital and the effects of treatment checked by frequent examination of blood slides. Mice were not available for inoculation.

Action of penicillin during the first febrile attack.

As soon as possible after diagnosis had been made 50,000 units of penicillin were given intravenously, followed by 150,000 units intramuscularly in divided doses every 3 hours during the next 24 hours. A blood slide was taken regularly every quarter of an hour for the first 2 hours of treatment, then one every hour for four hours, and then one every two hours. [For how long is not stated.] The temperature fell either at once or by lysis in the next two or three days. Spirochaetes disappeared from the peripheral blood after very variable periods.

The authors' observations have led them to doubt whether penicillin has any definite influence on the course of the febrile attack. Various cases are discussed in detail and the final conclusion was that 200,000 units in 24 hours gave practically no immediate results. Two patients were given 1,000,000 units in 24 hours but without any conclusive proof of the efficacy of such dosage.

Action on relapses.

It was considered that in doses of 200,000 units penicillin did not prevent relapses, and that the effect of larger doses should be tried. There appeared to be evidence that the form in which the spirochaete persists during apyrexial periods is more easily affected by penicillin. Seven cases where the drug was given during such periods showed no relapse, but unfortunately inoculation of mice could not be carried out in these instances. Trial was made of an oily solution of the drug in doses of 150,000 to 300,000 units in 24 hours but without any striking results.

The authors' final conclusions were as follows :—

A dose of 200,000 units of penicillin is ineffective in preventing relapse when given during the first febrile attack. It remains to be seen whether larger doses would have a better effect.

On the other hand it appears that the same dose given in the apyrexial periods, at a time when the spirochaete is not demonstrable by ordinary blood examination, is effective in preventing relapses. Such treatment would appear to check the spread of the disease, as patients at this time are still capable of transmitting the organism.

Finally, case notes are given of 22 patients observed and treated.

C. F. Shelton

YAWS

GOMES, L. de S. Provas laboratoriais em dois casos de boubá. Forma circular do *Treponema pertenue*. [**Laboratory Findings in Two Cases of Framboesia. Circular Form of *Treponema pertenue***] *Rev. Inst. Adolfo Lutz*. São Paulo. 1950, v. 10, No. 1, 67-70, 3 figs.

The English summary appended to the paper is as follows :—

"Two cases of Framboesia observed in São Paulo furnished material for this research.

"The author says that he has carried on thousands of dark field examinations for *Treponema pallidum* and never saw circular forms of the germ as he did in the two cases of Framboesia. He recalls that Prowazek, in 1907, called attention to these forms of *Treponema pertenue* which he named resting, oval or rounded.

"It is possible that the number and position of the flagella, which is different in these species, may contribute to make easier the formation of the circular forms in the case of *Treponema pertenue*.

"The cultures carried on by the author on several media showed no growth.

"Inoculations of the material in two *M. rhesus*, one adult and the other young (6 months) were also negative."

MONTÉL, L. R. Propriétés antibiotiques de l'huile de Chaulmoogra. (Son action dans les tréponématoses.) [**Antibiotic Action of Chaulmoogra Oil. Its Action in Treponematoses**] *Rev. Coloniale de Méd. et Chir.* 1951, Oct. 15, v. 23, No. 195, 232-4.

MontéL recalls that 12 cases of yaws were treated on his behalf in Oubangui-Chari, French Equatorial Africa, with intramuscular injections of *Hydnocarpus wightiana* oil and guaiacol three times a week [dose and duration of treatment given in previous paper, this *Bulletin*, 1951, v. 48, 472]. Clinical cure had occurred in 8-10 days. The serum from 6 of the patients was still Wassermann positive a month after treatment. Similar clinical cure followed the administration of *Taraktogenos kurzii* oil without guaiacol.

He also recalls a case of syphilis [this *Bulletin*, 1951, v. 48, 473] in which the serum Wassermann reaction was negative 6 years after treatment with chaulmoogra oil. A rabbit after intratesticular inoculation with the Nichols strain of *Treponema pallidum* and treatment with chaulmoogra oil, instead of developing characteristic testicular thickening, proceeding to ulceration, developed 3 fistulae along the tracks of the inoculations; treponemas in the serous exudate were very sluggish.

In leprosy the author has found that the ethyl esters of chaulmoogra have never been as effective as the natural oil.

This paper is merely to call attention to the anti-treponemal and bacteriostatic actions of chaulmoogra oil and is not intended to promote its use in these diseases.

C. J. Hackett

REYNOLDS, F. W., GUTHE, T. & SAMAME, G. **A Rational Approach to Yaws Control.** *J. Venereal Dis. Information.* 1951, Oct., v. 32, No. 10, 263-73, 3 figs. [45 refs.]

The authors, who are senior officials in the Venereal Disease Section of the World Health Organization, briefly review the recent advances in the treponemal diseases and stress the great value of penicillin in their treatment. In early syphilis cure can be expected if an adequate blood level (above 0.03 unit per ml.) of penicillin G can be maintained for 4-6 days. A single intramuscular

injection of 0.3-2.4 million units of procaine penicillin G in oil with 2 per cent. aluminium monostearate (PAM) gives effective blood levels in 90 per cent. of patients.

The action required in the control of yaws in primitive communities may be divided into five stages :

- (1) *Orientation and preliminary analysis of the problem*, that is, the recognition of nature and extent of the yaws problem and its relationship to other health needs.
- (2) *Development of methodology*, that is, planning of operations, including funds, personnel, supplies, equipment, transport, etc.
- (3) *Demonstration, survey and training* by a team consisting of a chief medical adviser, a serologist, a public health nurse and a specialist in health education of the public which should operate a pilot scheme as a test and demonstration. During this stage it is essential that members of the local personnel are closely associated and, if necessary, trained so that they will be able to carry out the fifth stage.
- (4) *Expansion or the "mass treatment campaign"*.
- (5) *Consolidation of activities* into those of the local Public Health Services without interfering with other important public health activities.

International organizations should be able to assist local efforts in anti-yaws activities ; the World Health Organization (WHO) in an advisory capacity, being most active in the first three phases and United Nations International Children's Emergency Fund (UNICEF) being most active in the fourth, although both would cooperate throughout with the local authorities.

The authors refer to the results of treatment of endemic syphilis in Bosnia in 1949 with 600,000 units of [presumably] PAM on alternate days for 6 doses. Originally 66 per cent. of a village population of 330 gave positive Kahn serum reactions, but 16 months after treatment 72 per cent. were negative, 24.9 per cent. had reduced titres and 3.1 per cent. showed no reduction in titres. No difference in results was observed in patients receiving penicillin alone or penicillin in the same doses and 10 ml. of 10 per cent. bismuth subsalicylate. This supports similar work on yaws. There is thus a strong indication for its application to yaws on a large scale. The primary object is to eliminate infectious cases. The authors recognize that the cost of the penicillin will be an expensive item and stress that it must be used in the most effective and economical doses. The WHO Expert Committee on Venereal Infections and Treponematosis recommend, until further evidence is available, that the minimum adult dose is 1.2 million units PAM repeated, where possible, in 3-5 days.

The observations of HARDING [this *Bulletin*, 1949, v. 46, 549] are quoted to stress the need for adequate follow-up and treatment after the mass treatment to combat infectious relapses.

It is stressed that the function of international organizations is to stimulate national efforts and not to be a substitute for them. The authors conclude that there is reasonable prospect, if control measures are adequately planned and executed, that yaws may ultimately cease to be a major public health problem.

[The article is an excellent brief statement of a rational approach to yaws control and takes into account practically all the important factors concerned. The authors do not mention the cost of the measures. An approximate cost (Jan. 1952) of each dose of 1.2 million units of PAM would be about 4 shillings, so that the cost per patient treated would be about 8 shillings. The comparable cost of 6 doses of nearsphenamine 0.6 gm. would be about 12 shillings and of 6 doses of a bismuth preparation would be a few pence. Thus while this last course of treatment was being given, three times as many patients could

have been treated with PAM by the same staff and equipment and at two-thirds the cost per patient. The lack of accurate knowledge of the epidemiology of yaws needs immediate correction and action based upon such extended knowledge might well prove the most economical way of controlling yaws, since many other problems would probably be dealt with at the same time.

There has been a statement in the medical press that a WHO Symposium on Yaws is to be held in Bangkok in March 1952.]

C. J. Hackett

LEPROSY

FLOCH, H. & DESTOMBES, P. Revue, à la disparition du bagne, de l'évolution du comportement de l'élément pénal devant l'endémie lépreuse en Guyane. [Review, on the Occasion of the Closing Down of the Penal Settlement in French Guiana, of the Evolution of the Endemicity of Leprosy] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 222. 1950, Dec., 12 pp. [15 refs.]*

The Penal Settlement in French Guiana was begun in 1852, but transportation ceased in 1939. In 1949 most of the prisoners were repatriated. Between 1867 and 1945, 53,890 prisoners were disembarked in French Guiana. The first two cases of leprosy were recognized in 1883, 31 years after the founding of the Settlement, one patient was a European and the other an Arab. The Islet of St. Louis was opened in 1895 as an asylum for leprosy subjects, of whom there were 30 in 1900, as well as some patients outside, and in 1925 LABERNADIE knew of 80 cases. From 1925 to 1948, 284 cases were found in the Settlement out of a total of 1,654 in the whole of French Guiana.

An analysis is given of 193 cases discovered between 1939 and 1949. Of them, 61 per cent. were Europeans, 23 Arabs, 8 Indochinese, and 7 per cent. "black". Not only was leprosy more common among the Europeans than among the other race groups but the type of the disease was more severe, there being 75 per cent. lepromatous among the Europeans, 64 among the Arabs, 45 among the Indochinese and 41 among the Negroes; also of 35 undifferentiated cases 6 became lepromatous later, and except for one Arab these were all in Europeans.

In the second part of the paper the discordant views of R. CHAUSSINAND and J. TISSEUIL regarding the effects of tuberculosis upon leprosy endemicity are discussed. The former holds that the two diseases are antagonistic and that the diminution of leprosy in Europe was connected with the increase of tuberculosis; the latter refutes this, pointing to the great amount of tuberculosis in French Guiana and the frequency of leprosy among the Creole population as well as among the Europeans and Arabs in the Penal Settlement, in spite of their being allergic to tuberculosis, the positive tuberculin reactions (according to Tisseuil) being 98 to 100 per cent.

The authors take up an intermediate view. According to them the rate of tuberculin positivity in France is only about 65 per cent. They point out that allergy is not immunity, although the former is a relative witness to the reality of the latter. Although there is no doubt that leprosy is worse among the prisoners than among the Creoles, there is nothing to prove that it is not just those with negative tuberculin reaction who are attacked. The authors conclude "it is not excluded that the parallergy of the lepromin reaction may be accompanied by a paraimmunity which, though partial, should not be neglected in the prophylactic campaign against leprosy in endemic countries, as it can easily be obtained by vaccination with BCG".

Ernest Muir

Row, R. *Mycobacterium leprae*. *Indian Physician*. 1951, Oct., v. 10, No. 10, 235-9, 3 figs.

The author had previously attempted to culture *Myco. leprae* in symbiosis with *Leishmania donovani*, and later in the diffusible, bacteria-free metabolites produced by *Myco. tuberculosis* [this *Bulletin*, 1949, v. 46, 264]. He now describes a similar attempt with the use of a combination of the two methods. At the end of a week he obtained a growth on potato tubes in the form of a slightly yellowish film. Smears showed a fairly uniform distribution of an irregular network whose framework is made up of long acid-fast bacilli arranged here and there in rough cigar-bundle-like patterns, very acid-fast in most parts. "All one can state definitely is that by symbiosis an acid fast organism has been isolated showing many morphological characters of *Myco leprae*."

Ernest Muir

DE SOUZA-ARAÚJO, H. C. **Demonstration of Two New Cultures of *Mycobacterium leprae hominis* (Strains "Chaves" and "Emilia") Pathogenic for *Macacus rhesus* and Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 151-4.

This is a report of continuation of work previously reported, and abstracted in this *Bulletin*, 1951, v. 48, 647 *bis*. Three cultures of acid-fast bacilli were obtained from leprosy patients. Two of these were repeatedly inoculated in rats, mice, monkeys and human beings, and recovered again without losing their acid-fast characteristics, and sometimes with increased virulence. Injections of cultures in rhesus monkeys produced very strong local and general reactions, and smears of pus, nasal mucosa and faeces were positive. In one monkey a local reaction was produced "so marked that on the 8th day the face of the animal looked like that of a lepromatous (L3) woman".

Forty volunteers with leprosy were inoculated. About 50 per cent. had lepra reaction, a few showed bacillaemia, and local reactions with crater formation at the sites of inoculation. All the patients showed general improvement.

Ernest Muir

CHAKRAVARTI, H. **Studies on Plasma Protein. IV. Leprosy.** *Indian Med. Gaz.* 1951, May, v. 86, No. 5, 196-9, 2 figs.

"(1) Plasma protein patterns in 47 untreated patients of leprosy were studied—29 cases were neural type and 18 lepromatous.

"(2) In neural type, changes were least marked in tuberculoid variety. In neuro-macular simple group, changes like hyperprotinaemia due to rise in the globulin fraction were found in many cases and the degree of such change varies directly with the extent of the lesion.

"(3) In lepromatous group as a rule considerable rises in total proteins and globulin were found in almost all the cases. Albumin was normal or slightly depressed only.

"(4) Hyperglobulinaemia found in these cases is similar to what has been observed in kala-azar cases but unlike kala-azar albumin fraction is least affected and from the power of albumin fabrication it is presumed that liver function is least affected in this disease."

LEPROSY REVIEW. 1951, July-Oct., v. 22, Nos. 3/4, 83-5. **Method of taking Biopsy Tissue for Histological Examination** [KHANOLKAR, V. R.].

This method is devised by Dr. Khanolkar so as not to distort or otherwise damage biopsy skin material. After sterilizing and anaesthetizing the skin a

piece of thread is "passed a little beyond the upper end of the area selected for biopsy". A very sharp Bard-Parker knife should be used and should cut down to the subcutaneous tissue so as to include fat. The elliptical piece of skin and subcutaneous tissue 1.5 cm. by 0.5 cm. is then freed by cutting parallel to the surface of the skin, while one end is raised by pulling on the suture. After cleaning with blotting paper, fixation in Zenker's fluid and washing for 12 to 18 hours in running water the tissue is placed in 40 per cent. rectified spirit and may be sent to a pathological laboratory for examination.

This description is given with much more detail in order that specimens from Africa and elsewhere may be sent, along with descriptions of cases, to the Medical Secretary of the British Empire Leprosy Association who will have the material sectioned and send detailed reports. "It is hoped that . . . ultimately co-operation may be sought with the Leonard Wood Memorial Foundation under their plan for the establishment of a Registry of Pathology in Washington." A description is also given of the Fite-Farco method of staining *Myco. leprae*, which technique "enables bacilli to be detected even when they are only to be found in the small subcutaneous nerves of the corium".

Ernest Muir

BRAGE, D. Neuralgias leprosas. [**Leprous Neuralgias**] *Semana Méd.* 1951, Oct. 18, v. 99, No. 16, 624-7.

Two cases are described and discussed of tuberculoid leprosy of the neural subtype. In the first there was trigeminal neuralgia on the right side which, after symptomatic treatment for 3 years, became generalized, the patient complaining of pains in the bones. A nodule of the musculo-cutaneous nerve in the forearm developed with extreme pain. A biopsy was done and neurofibroma was excluded. It was only after another 18 months that leprous macules developed and a diagnosis of leprosy was made. In the other case of the same type and subtype the original symptoms resembled acute abdomen, and persistent pains in the whole body. As the patient had had syphilis, aneurysm and tabes were thought of as possible causes. It was only later when the left hand began to develop weakness, and there were signs of Aran-Duchenne type, that thickening of the ulnar nerve was noticed and a diagnosis of leprosy made.

Emphasis is laid on the obscure early signs of leprosy in some neural cases in which the bacillus cannot be found, and on the fact that in an endemic country like Argentina leprosy should be kept in mind when such obscure neural signs occur.

Ernest Muir

GARRETT, A. S. **Mass Treatment of Leprosy with D.A.D.P.S. (Dapsone).** *Leprosy Review.* 1951, July-Oct., v. 22, Nos. 3/4, 47-53.

This is the report of the results of treatment with DDS of 9,000 patients in Nigeria for a period of 13 months. The very primitive methods of supervision, made necessary by the lack of qualified staff, are described. In the Onitsha province there are about 1,000,000 people, and 20,000-30,000 of them have leprosy. About half the area has facilities for outpatient treatment within 5 miles of the patients' homes, and over a quarter has facilities for segregation of open cases. Only patients able to segregate themselves or able to attend twice a week were accepted for treatment. This was given in 0.1 gm. tablets, beginning with 1 tablet and gradually rising to 4 twice a week. Anaemic patients were first treated with iron. "The great majority of the patients

complained of general weakness and depression with increased desire for food during the second month of treatment. The mental and physical depression was very obvious in each community of patients during the second, but during the third month and later this gradually changed to enthusiasm as they became 'acclimatised' to dapsone [DDS] therapy. After about 8 months few complain of feeling weak, and many say their limbs are not so 'heavy' as they were before dapsone treatment."

About 3 per cent. of the patients had dermatitis, and this resulted in 4 deaths. In 2 of these the doctor's instructions had not been followed, one was a weak old man, and one was a healthy adult who developed hyperpyrexia. All these deaths occurred in the first 2,000 patients, and it is believed that with more experience there should be no deaths. All the cases of dermatitis occurred within the first 12 weeks. The rules developed for dealing with dermatitis are: (1) cessation of DDS treatment at once, (2) keeping the patient in hospital, (3) antihistamine treatment. There were two patients with jaundice following dermatitis, one of whom died.

There were 24 cases of psychosis, but all of these patients had been on larger dosage of daily treatment before the twice-weekly treatment had been introduced.

This experiment has shown that DDS treatment is practicable on a mass scale in outpatient clinics with very little supervision, provided the small twice-weekly dosage is adhered to. The results with this dosage were found to be as good as those with inpatients who got 0.2 gm. six days a week, a total per week of 50 per cent. more. The results in tuberculoid cases were particularly rapid, in some the clinical condition being completely changed in 6 weeks after only 18 tablets had been taken. The more acute and marked the signs, frequently the more rapid the subsidence of the lesions. The author concludes thus: "There are, taken all round, as great dangers with much less success from using hydnocarpus oil, the only practical alternative".

Ernest Muir

BARNES, J. & BARNES, E. J. **Liver Damage during Treatment with Diaminodiphenylsulphone.** *Leprosy Review*. 1951, July-Oct., v. 22, Nos. 3/4, 54-6.

This condition has already been described [see this *Bulletin*, 1951, v. 48, 1126]. A case is reported of an African woman of 30 suffering from a mild type of leprosy. She was given hydnocarpus injections and tablets of DDS gradually rising to a daily dose of 200 mgm., six days a week. After 6 weeks of treatment she developed swelling of the feet and ankles, jaundice and an irritating rash on the abdomen, thighs and forearms. There was no enlargement of the liver. The woman was four months pregnant. She improved under treatment at first, but later got gradually worse and died on the 16th day of illness. At autopsy the liver showed signs of severe necrosis with marked signs of regeneration.

In 153 patients treated with DDS for 2 to 6 months, 5 other cases of hepatitis were seen, 4 of them with enlarged and tender livers. They were all on daily doses of 200 mgm.

[It is interesting to compare these results with those described in the previous abstract, where hepatitis though present is not considered a serious complication, also Lowe's report of liver damage [see this *Bulletin*, 1951, v. 48, 1000]. Possibly the difference in dosage may have something to do with these differences. All three reports are from the same part of Nigeria. On the other hand hepatitis does not appear to complicate DDS treatment outside W. Africa.]

Ernest Muir

FLOCH, H. & LECUILLER, A. Mode d'action des sulfones dans la lepre (V). Comment agit l'aminohydroxy-éthylaminodiphénylsulfone (sulfone monosubstituée) administrée par la voie buccale. [**Mode of Action of Sulphones in Leprosy (V). How Aminohydroxy-ethylaminodiphenylsulphone (Monosubstituted Sulphone) Acts when administered Orally**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 233. 1951, July, 4 pp.*

This substance, also known as 1087 MM., is a monosubstitute, and this study was to test its stability and whether it is transformed into DDS in the body. The conclusions are that when given by the mouth 1087 is recovered from the blood unchanged; it is eliminated from the urine either unchanged, or in the form of a product of transformation, or as a mixture of the two. Unlike the other sulphones (Promin, DDS, 1500F) which are transformed chiefly in the liver, 1087 appears to be transformed in the kidneys, but it is not eliminated in the form of DDS, as are the other sulphones. *Ernest Muir*

FLOCH, H. Le 1087 MM, sulfone monosubstituée, en thérapeutique anti-lépreuse. [**1087 MM, Monosubstituted Sulphone, in Anti-leprosy Therapy**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 235. 1951, Aug., 4 pp.*

This monosubstitute, after trial for 7 months on 10 patients, was found to give results exactly similar to the other sulphones and particularly to 1500 F, a succinyl monosubstituted sulphone. The author considers these two sulphones, along with DDS, to have properties particularly interesting among all the sulphones. *Ernest Muir*

FLOCH, H. & HORTH, R. L'association sulfones-thiosemicarbazone dans la thérapeutique anti-lépreuse. [**The Association of Sulphones and Thiosemicarbazone in Anti-leprosy Treatment**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 232. 1951, June, 6 pp. [Refs. in footnotes.]*

After reviewing the literature on the treatment of leprosy with thiosemicarbazone (TB1) the authors describe their own cases, 30 in number. Eleven of these were given a mixed treatment, 2 being on TB1 and 1500 F and 9 on TB1 and Disulone. The conclusions arrived at are that: thiosemicarbazone is active in leprosy and superior to chaulmoogra and its derivatives; it is similar in its action to sulphones in clearing up the clinical signs of lepromatous cases, at least for the first 3 months of treatment; it is inferior to DDS and 1500 F in its action against bacilli; mucous membrane lesions are less sensitive to its action than to that of the sulphones; nerve lesions often resist TB1 as they do sulphones. The chief uses of TB1 are when sulphones are badly tolerated, in patients with lepra reaction especially that caused by sulphone treatment, and when there is a hold-up in clinical or bacteriological improvement under sulphone treatment. *Ernest Muir*

DOULL, J. A. Los antibióticos en el tratamiento de la lepra: revisión. [**Antibiotics in Treatment of Leprosy: a Review**] *Bol. Oficina Sanitaria Panamericana. 1951, Sept., v. 31, No. 3, 217-22. [13 refs.] English summary.*

HELMINTHIASIS

See also p. 144, NEGhme R. & SILVA C., **Fresh Studies on the Prevalence of Intestinal Parasites in Chile. Third Communication.**

HERDT, Jean R., LOOMIS, L. N. & NOLAN, M. O. **Effect on Calves of Prolonged Oral Administration of Three Potential Molluscicides.** *Pub. Health Rep.* Wash. 1951, Oct. 12, v. 66, No. 41, 1313-17, 1 chart.

"The effect on cattle of repeated sublethal doses of three potential molluscicides, sodium pentachlorophenate, copper pentachlorophenate, and pentabromophenol was determined. The chemicals were given to three young bulls in their drinking water at a dosage of 7.6 mg./kg./day for at least 5 weeks. No significant deviations from normal were found in pulse, respiration rate, temperature, urinalyses, or in blood counts. Post-mortem examinations revealed no toxic manifestations. It is believed that these halogenated phenols can be used with safety as molluscicides in the field provided reasonable precautions are taken in their application."

STOHLMAN, E. F. **The Toxicity of some Related Halogenated Derivatives of Phenol.** *Pub. Health Rep.* Wash. 1951, Oct. 12, v. 66, No. 41, 1303-12.

"1. The systemic symptoms produced by toxic doses of pentachlorophenol were increased respiratory rate and amplitude, muscular weakness and collapse. In general, this syndrome was also produced by all the other related derivatives of phenol reported here except pentabromophenol. Pentabromophenol, in addition to the above symptoms, produced generalized tremors and occasional intermittent convulsions. In many respects the symptoms resembled those of DDT poisoning in the rat.

"2. The acute toxicities of these compounds ranged in the following descending order: Santobrite, pentachlorophenol, pentabromophenol, the copper salt of pentachlorophenol, 2,4,6-tribromophenol, and 2,4,6-triiodophenol. Relatively no cumulative toxicity was produced by five consecutive daily doses of the first three compounds, but moderate cumulative effects were produced by the last three compounds under the same conditions.

"3. Gross post-mortem findings were hemorrhages and congestion of the lungs, produced to a greater or lesser degree by all the compounds. Large doses of 2,4,6-triiodophenol produced severe inflammation, corrosion, and hemorrhages of the mucous membrane of the stomach. These were also produced to a lesser extent by 2,4,6-tribromophenol."

MOHR, W., BERKA, W., KNÜTTGEN, H. & OHR, A. Das klinische Bild der Distomatosis hepatica (*Fasciola hepatica*) und ihre Therapie. [**The Clinical Picture of Distomatosis hepatica (*Fasciola hepatica*) and its Therapy**] Reprinted from *Med. Monatsschr.* 1951, Oct., No. 10, 676-81, 6 figs. [18 refs.]

The authors record in considerable detail the clinical features shown by 5 cases of human fascioliasis. For the details the original paper must be consulted. Four of the cases occurred in North Germany, one south-east of Hamburg, two near Bremen and one in Holstein. These are, the authors say, the first records of this disease from North Germany and, together with one other case communicated to the authors, they bring the number of German cases known to 12. Pieces of liver were excised from two of the patients and the histological features seen in them are described. The authors quote the

detailed description of the clinical features given by PAUL [this *Bulletin*, 1927, v. 24, 981] who pointed out that the first clinical symptoms appear at least 1 to 2 months after infection with cercariae. This long incubation period may lead to failure to recognize the disease.

The first of the authors' cases has already been described by EHLERS and KNÜTTGEN [*ibid.*, 1950, v. 47, 638]. The patient was a girl aged 8½, who had eaten apples, found in a ditch, on which there were cercariae. This patient was in the acute febrile stage with eosinophilia described by KOURÍ [*ibid.*, 1948, v. 45, 799]. The second of the authors' cases (and also another case communicated to them by Dr. GRONEWOLD) was also in this stage, but their other 3 cases were of the chronic type.

The second patient was a girl aged 5 infected by eating sorrel in damp meadows in which sheep were grazing. This child also was in the acute febrile stage described by Kourí. Figures show the temperature charts. She was severely ill with an enlarged liver and spleen and a leucocytosis of 39,000 per cmm. with over 85 per cent. of eosinophiles. For the other details the original paper must be consulted. Eggs of *Fasciola* were found only once during stool examinations carried out for 8 weeks, but the authors point out that the number of eggs found bears no relation to the severity of the symptoms. Liver abscess was suspected and an exploratory laparotomy revealed a liver and spleen with peculiar yellowish streaks 1 mm. broad and 1 to 2 cm. long. In a piece of liver excised there were multiple abscesses arranged in streaks with many eosinophiles and Charcot-Leyden crystals; the necrotic marginal zone was walled off by giant cells. Intradermal and complement-fixation tests were positive. After treatment with emetine and aureomycin given for a secondary infection of the bile ducts the patient improved, but she finally died.

The third case was that of the 8-year-old sister of the second patient. Eggs of *Fasciola* were found in the stools. There was no temperature and the child was not severely ill. The liver was enlarged to 3½ and the spleen to 2½ finger-breadths below the costal margin. There was an eosinophilia of 58 per cent. and the skin and complement fixation tests were positive. After treatment with emetine the liver and spleen returned to normal and the eosinophilia fell to 30 per cent. This case was not seen so early after infection as the second one. Presumably the mode of infection was the same. Cases lasting years are recorded in the literature.

The fourth case was in a woman aged 55 in good general condition who had taken refuge from the bombing of Hamburg in the country at a house near which many sheep and cows were kept. She gave a history of gastric troubles at times, with foul eructations, sensations of needle-pricking in the liver region, nausea and frequent foul taste in the mouth. X-ray examination caused suspicion of obstruction of the gastric outlet and laparotomy revealed numerous nodules of variable size up to that of a small apple in the left lobe of the liver, some visible and some not. The right lobe of the liver and the gall bladder were normal and there was no tumour or stenosis of the stomach or duodenum; but the stomach was broad and thick-walled, presumably as a result of pressure of the left lobe on the stomach outlet. In a piece of liver excised there were streak-like abscesses and necrotic areas surrounded by epithelioid cells and giant cells and a peripheral eosinophile infiltration and Charcot-Leyden crystals. At this time the leucocytes were 15,000 per cmm. with 47 per cent. of eosinophiles. Neither *Fasciola* nor its eggs were found, but intracutaneous and complement-fixation tests were positive. After emetine treatment the leucocytes fell to 10,200 per cmm. and the eosinophiles to 14 per cent. After six months the eosinophiles had fallen slowly to 10 per cent. and the complement-fixation test was then negative. The patient had no further troubles. The

peculiar features of this case were the absence of eggs during an infection lasting over half a year and the location of the flukes in the liver and not in the bile ducts. The authors consider the history of unexplained upper abdominal pain especially noteworthy. When this occurs on the right side of the abdomen in a patient in agricultural surroundings, the possibility of fascioliasis should be considered. Their fifth patient had similar symptoms from the autumn of 1942 to the following February, but the cause of the right-sided pain was not found in spite of X-ray examinations and repeated duodenal soundings; but in September, 1950, eggs of *Fasciola* were found by means of a duodenal sound, although this failed twice subsequently to reveal eggs; yet in October, 1950, eggs were again found by this method. The complement-fixation test was negative in this case.

Kouri's febrile eosinophile syndrome is relatively easily identified by the irregular, "septic" temperature, the leucocytosis with a more or less marked eosinophilia, the sensitivity and enlargement of the liver and possibly, though not always, of the spleen as well, the positive intradermal and complement-fixation tests, the discovery of the eggs after repeated examination of stools and the duodenal contents and the histological picture in excised liver tissue. Diagnosis of the more chronic types of the disease is, as cases 3, 4 and 5 show, more difficult.

G. Lapage

FU, H. H., WU, Y., WU, K. H. & CHOW, Y. **Areca Nut in the Treatment of *Diphyllobothrium latum* Infection. Report of a Case.** *Chinese Med. J.* Peking. 1951, Sept.-Oct., v. 69, Nos. 9/10, 407-9.

"1. A case of *Diphyllobothrium latum* infection with more than 8 worms was treated with areca nut with good immediate result.

"2. Atebrin was used half a month prior to the use of areca nut with unsatisfactory result.

"3. No anemia, eosinophilia or any detectable change of nutritional status was observed in spite of such a heavy infection.

"4. Protracting nausea, retching and some abdominal pain were observed following the areca nut treatment in our case."

[See also this *Bulletin*, 1952, v. 49, 66.]

BECKER, B. J. P. & JACOBSON, S. **Infestation of the Human Brain with *Coenurus cerebralis*. A Report of Three Cases.** *Lancet*. 1951, Aug. 4, 198-202, 8 figs.

Three cases of human infection by the larval phase of the tapeworm, *Multiceps multiceps* are reported.

All three patients were males who lived in sheep-raising districts in South Africa and all had at some time of their lives been closely associated with dogs.

In each case there was a history of several years of developing symptoms; the signs and symptoms were those of increasing intracranial pressure, severe headaches, radiating down the neck and spine, vomiting and papilloedema. The cerebrospinal fluid was under high pressure, it was clear but contained increased protein and showed a cellular response with lymphocytes predominating.

The focal symptoms varied; there were fainting attacks with perspiration and momentary losses of consciousness, followed by shakiness and a sense of fatigue, convulsive movements of the limbs, temporary anaesthesiae and pareses, staggering gait and rombergism.

The mental states were at times affected ; this suggested a toxic psychosis which was particularly noticeable after operative treatment.

In two out of the three cases the complement-fixation test with hydatid antigen was positive.

After preliminary ventriculography, which in some showed dilatations, operative treatment was undertaken : this consisted in exposing the posterior fossae and removing as many of the cysts as possible from the cerebrospinal fluid pathways.

In all of them the post-operative course was stormy and the convalescence slow : in each improvement was reported but no details of the clinical conditions were given and no " follow-up " is reported.

The larvae in the three cases, as in other cases reported, were all in the cerebrospinal fluid pathways and caused symptoms by pressure and obstruction of the narrow portions of these pathways. The toxic psychotic symptoms were apparently caused by transudation of the fluid in the cysts, or its release by rupture.

" The cysts vary in size from a few millimetres to two or more centimetres in diameter. They vary also in shape from globular to sausage-like. Through the semi-transparent and milk-white cyst wall the cloudy contents can be seen, which never seem quite to fill the cyst. Under a hand-lens the clusters of scolices can be seen in groups appearing as minute opaque foci on the inner wall.

" Aspiration of the contents produces a cloudy fluid containing numerous calcific bodies but no scolices. The scolices are best demonstrated by dissecting out one of the clusters of scolices represented by the opaque spots on the inner cyst wall, mounting it in glycerin, and examining it with the low-power objective. Multiple small scolices, each with an invaginated head, are seen to arise from the inner germinal wall. These have the typical segmented structure of tapeworm larvae."

The life cycle of this tapeworm (*M. multiceps*) is as follows : dogs become infected by eating the discarded brains of sheep which contain the larvae (so-called *Coenurus cerebralis*) ; these develop into adult worms in the intestines of dogs ; the dogs contaminate the sheep pastures ; and the latter become infected by ingesting the ova passed in the dogs' faeces. Man takes the place of the sheep in the cycle.

The authors state that there are records in the hospital files of 11 (other) cases with similar syndromes in which the cysts were not examined, for various reasons. They consider that in sheep-raising countries this infection in man is therefore not rare, but relatively common [see this *Bulletin*, 1949, v. 46, 950].

L. E. Napier

NÁJERA, L. E. El soporte biológico del *Echinococcus granulosus* y la epidemiología de la hidatidosis. [**Ecology of *Echinococcus granulosus* and the Epidemiology of Hydatid Disease**] *An. Med. Pública*. Santa Fe. 1950, v. 2, Nos. 3/4, 571-93, 3 diagrams. [13 refs.] English summary.

The term " soporte biológica " has no exact English equivalent ; perhaps the nearest is " ecology ". It implies the chain of circumstances which, under natural conditions, secure and maintain the survival of a parasite, illustrated in the present instance by *Echinococcus granulosus*. The author traces the life-history of the parasite, naming the type-species and 9 others. The animal in which each was first reported is stated. The author points out the three necessary stages, or conditions for the life of the parasite : (i) the soil ready to receive the eggs from the adult *Taenia* ; (ii) the intermediate host for the larval stage ; (iii) the definitive host harbouring the adult worm. A full list

is given of the mammalia in which the larval stage has been found. Of 65 families named only 19 are known to harbour the parasite. The author shows that from the human epidemiological point of view the important question is control of the domestic dog.

H. Harold Scott

DE BERNARDI, E. **Pulmonary Hydatid Disease in Man.** *Acta Radiologica.* 1951, Sept., v. 36, No. 3, 234-40, 9 figs. [15 refs.]

"The author discusses the roentgenological signs of pulmonary hydatid disease, which are important in making a differential diagnosis, and draws attention to the growth and modification in the appearances of the cysts. Some illustrative cases are presented."

HANDOUSA Bey, A. **Proptosis caused by Hydatid Disease.** *Brit. J. Ophthalm.* 1951, Oct., v. 35, No. 10, 607-13, 2 figs.

DE MAGISTRIS, L. Sulla distribuzione dell'anchilostomiasi nel Comune di Napoli. [**Ancylostomiasis in Naples**] *Acta Med. Italica.* 1950, June, v. 5, No. 6, 157-8.

This appears to have been a clinical lecture given at the Naples University. It starts with general remarks on hookworms, their discovery by DUBINI in 1838 and a description of them and their larvae, after which the author records in a table the number of cases of infection noted in 6 zones of the Naples municipality in the 18 years, 1931-48 inclusive. In four of these years, 1943, 1945, 1946 and 1948, there was none recorded. [It is difficult to estimate what reliance can be placed on the figures given in the table of details, for in 11 of the years the totals are added up wrongly and in one district the total for the whole period is wrong, according to the detailed annual figures.] The most heavily infested zone is Ponticelli in which 99 cases are mentioned, and next comes Barra with 44, and, third, Poggioreale with 28 [recorded as 30, but the addition is wrong]. Three zones, S. Lorenzo, S. Giovanni and Chiaia, have only one each and these were probably infected in Ponticelli. Those attacked were field workers and peasants and, when a patient was discovered, others of the family were examined and some of them might be found positive.

H. Harold Scott

BELLONI, G. & MUZZOLINI, M. L'anchilostomiasi nel suburbio di Padova. [**Ancylostomiasis in the Suburbs of Padua**] *Acta Med. Italica.* 1950, June, v. 5, No. 6, 162-8, 1 map.

The authors have examined the faeces of 330 persons in some half a dozen areas of Padua and found ova of *A. duodenale* in 80 (24.2 per cent.) ; 54 per cent. [43] were males and 46 per cent. [37] were females. Those affected were peasants and growers of vegetables. The locality is intersected by canals at the side of the streets, 20-30 cm. in depth ; these run very near to the dwellings, in fact the latrines are only 5-10 metres from these canals or gutters, and the water is taken for irrigation and the people wash their hands and feet in them on returning from work in the fields. Those infected suffer from creeping eruption and ground itch and present signs of hypochromic anaemia, with red corpuscles between 1,620,000 and 3,515,000 per cmm., with an average of 2,700,000, and haemoglobin between 20 and 65 per cent., average 35.5 ; leucocytes between 5,900 and 16,400 per cmm. and eosinophiles ranging between

7 and 34 per cent. Three drugs have been used in treatment, thymol, carbon tetrachloride and tetrachlorethylene, and good results were obtained with each of them but best with the last in doses of 4-5 cc. daily for three successive days.

H. Harold Scott

CHATTERJEE, P. K. & ROY, B. B. **A Severe Case of Anaemia associated with Hookworm not responding to Oral Iron Therapy and Parenteral Liver Extract treated with Intravenous Iron.** *Indian Med. Gaz.* 1951, May, v. 86, No. 5, 201-2, 1 chart.

CORCOS, A., DELASTRE, R., CHELLY, M. & ABITBOL, S. Sur un cas de péritonite par perforation ascaridienne de l'intestin. [**A Case of Peritonitis from Perforation of the Intestine by Ascaris**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 433-5.

This is a short note on the case of an Arab boy, aged 5 years, who was admitted to hospital suffering from an acute peritonitis. The illness had begun 20 days previously with fever and pulmonary signs, apparently due to influenza, which subsided under treatment. Ten days later the child began to complain of severe abdominal pain, the temperature rose again and the abdomen became distended, but the bowels acted daily and there was no vomiting, though the passage of flatus was arrested. On examination the abdomen was found to be enormously distended, there was dullness in the flanks and disappearance of the liver dullness; there were scattered physical signs in the lungs, insufficient to account for the patient's grave general condition. A plain X-ray of the abdomen showed fluid levels and gas above the liver. Laparotomy was performed, releasing free gas and pus and the abdomen was closed with drainage, without any attempt to search for the cause of the peritonitis, as the patient appeared to be *in extremis*. The original diagnosis of tuberculous peritonitis was changed to enteric fever with perforation, which appeared to be supported by the agglutination reactions. However, the patient's condition improved rapidly and a few days later an *Ascaris* escaped from the faecal fistula and another was found in the dressings. Treatment with anthelmintics completed the cure and the patient was discharged 5 weeks later with the wound healed.

W. L. Harnett

COORAY, G. H. **Embryonated Eggs of *Ascaris lumbricoides* in the Wall of a Human Hernial Sac.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 62-5, 5 figs. on pl.

The hernial sac removed by operation from an apparently healthy child was found to be thickened, and on sectioning was shown to contain embryonated ova of *Ascaris lumbricoides* in the lumen and in the walls of the sac. The ova appeared healthy and most of them contained larvae. The characteristic coarsely mammillated outer layer of the ova made their identity certain.

"An intense inflammatory reaction, characterized by polymorphonuclear exudation, fibrin formation and haemorrhages, could be seen in the lumen of the hernial sac. Some distance away from the lumen, in the deeper part of the sac wall, the ova were surrounded by mononuclear cells amidst which some spindle-shaped fibroblasts were seen. Further away from the ova there was a marked increase of collagen fibrils, and the tissue was less cellular. Although collections of eosinophile occurred here and there in the tissues, any well-marked eosinophilic infiltration was absent."

The stools of the child were not examined.

The presence of the ova in this unusual position is discussed. The author tends to dismiss the more obvious explanation of the direct route into the peritoneal cavity through a small perforation, on clinical grounds ; there was no history of any attack which could be explained as an attack of local or general peritonitis. The other possible explanations are that the larvae have migrated through the lung capillaries to reach the systemic circulation, or that this has been achieved through a cardiac septal defect. The appearances are shown in 5 photomicrographs.

L. E. Napier

DE SILVA, G. **Toxaemia due to Round Worm Infection. (A Plea for Preventive Treatment.)** *J. Ceylon Branch Brit. Med. Ass.* 1950, Mar., v. 45, No. 1, 43-5.

Round-worm [presumably *Ascaris lumbricoides*] infection is very common in the country districts in Ceylon ; the author found nearly 44 per cent. of his children patients (aged 1 to 6 years) infected in 1947 and 50 per cent. in 1948.

He divides the cases into four groups ; in the first, the child is emaciated and "pot-bellied", has a poor appetite and "eats dirt and is thirsty", but is otherwise fairly well. The mother reports that the child sleeps on its stomach and that it passes worms occasionally. To such a child the author gives worm treatment at once and repeats it a month or two later. [He does not state what treatment he gives, but elsewhere refers to santonin 3 to 5 grains.] The prognosis is good.

In the second group, the child is brought with vomiting and diarrhoea (or constipation) and a history of the passing or vomiting of worms. The child is usually drowsy and restless and has a little fever. There is a history of previous similar attack with the passage of worms. In such cases, the author withholds worm treatment, but gives a diaphoretic mixture, bromide or phenobarbitone, an enema if the child remains constipated, a few drops of adrenaline in glucose water if she continues to vomit, and prescribes plenty of fluid by mouth. Later, when the child's condition has improved, he gives treatment for the worms.

In the third group, a child who is ill from some other disease vomits worms : in such a case he postpones treatment, but not for long.

In the fourth group, the child is very toxic and has a high fever, she vomits anything given by mouth and is restless. There is a past history of the vomiting of worms and of previous such attacks, often of a milder type. Worm treatment is withheld but 1/12 grain of santonin is given every two hours until the vomiting ceases. Fluid is given by all routes. Stimulants are given and if the child is having fits a lumbar puncture is performed. The prognosis is uncertain and many children die.

The author emphasizes the public health importance of round-worm infection and recommends early treatment before symptoms appear.

L. E. Napier

WERLE, E. & RINGLER, W. Über die Wirkung des Cölomsaftes von Ascariden nach intravenöser Injektion beim Hund. [**The Action of Coelomic Fluid of Ascarids after Intravenous Injection in Dogs**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1951, Nov. 5, v. 109, No. 1, 60-65, 3 figs. [15 refs.]

SOUTH PACIFIC COMMISSION. **Summary of Proceedings. Conference of Experts on Filariasis and Elephantiasis.** Tahiti, French Oceania. 1951, Aug. 21 to Sept. 1. Fil. Conf./11. 22 mimeographed pp.

This is an account of the first International Congress on Filariasis ever to be held, and as such is likely to become historic. The decision to hold such a Congress in Tahiti is the outcome of a resolution of the South Pacific Conference held in Suva in April-May, 1950.

The Conference was presided over by H. E. the Governor of French Oceania. Dr. E. Massal, who has taken such an interest in the disease as it occurs in the Pacific, was elected Secretary.

The objects of the Conference were : to define the various problems raised by filariasis and elephantiasis, especially in the S. Pacific area ; to determine research work to be continued or undertaken in order to solve these problems, and to propose and recommend appropriate measures to be taken for the control of these diseases, taking into account social and economic conditions.

Taking part were 21 representatives from Australia, New Zealand, New Caledonia, Cook Islands, Tahiti, Hawaii, Fiji, Samoa, Washington, New York, and the University of California. Also present during the Conference were observers from interested lay groups in Tahiti.

Dr. T. C. BACKHOUSE in his report on parasitology discussed the proposal that the Pacific form of the parasite, *W. bancrofti*, should be henceforward recognized as a variety, as originally put forward by the reviewer and which had been endorsed by the late Professor Emile BRUMPT.

With the aim of adding to our knowledge of the morphology of this parasite it was recommended that the S. Pacific Commission should establish and maintain a type collection of *Wuchereria* collected from as many parts of the world as possible for further study by parasitologists. Instructions for methods of collecting and recording specimens have been laid down.

Regarding the longevity of *Wuchereria*—a vexed question—studies should be made on people leaving the endemic for non-endemic areas to determine the period during which microfilariae can be detected, as has already been done in Samoans migrating to Hawaii [this *Bulletin*, 1951, v. 48, 824].

Regarding periodicity it is urged that more intense studies should be made on the variation of microfilarial levels in persons from other areas in the Pacific where knowledge of periodicity of *W. bancrofti* is particularly deficient.

Entomology in the Pacific is all-important. Dr. L. ROSEN urged the importance of the taxonomy of the *Aedes scutellaris* group in the S. Pacific with specific reference to *A. scutellaris horrescens* and the maintenance of a type collection of the mosquitoes in this area. The preparation and circulation of photomicrographs of the larval stages of *W. bancrofti* and other nematodes liable to be confused with them should be undertaken. Special attention should be paid to the vector potentialities of *horrescens* and *Culex fatigans* in transmission. The susceptibility of various potential mosquito vectors to various blood levels of microfilariae should be assessed and experiments should be undertaken to hybridize closely related species of mosquitoes.

Dr. E. R. R. BRYGOO, in his studies on the epidemiology of filariasis, made a special point of the example of New Caledonia where neither *Anopheles* nor any members of the *scutellaris* group of *Aedes* are present, but where non-periodic filariasis is widespread. He urged that a special search should be made in New Guinea for the possible occurrence of *W. malayi*. On the value of humoral reactions Dr. W. H. WRIGHT presented experimental results of a comparative study of complement-fixation reactions, skin tests and a new flocculation test which he had devised. Very considerable inconsistencies in the results of intradermal tests with *D. immitis* antigen were reported. Dr. J. HEULS discussed the possibility of trans-placental passage of microfilariae and reported three cases of the discovery of microfilariae in the blood of the umbilical cord.

The Conference especially recommended that measures should be enforced to prevent the importation of mosquitoes from one area to another by aircraft.

Dr. P. E. C. MANSON-BAHR, in his paper on the pathological and clinical aspects, suggested the classification of the infection into three stages—primary

or allergic, secondary or carrier and tertiary or obstructive—as providing a useful working hypothesis. It was agreed that chyluria may occur in the South Pacific and could be caused, as elsewhere, by *W. bancrofti*.

On the chemotherapy of filariasis Dr. W. H. WRIGHT suggested that the evidence of the lethal action of hetrazan (Notezine or Banocide) on the adult worms was as yet inconclusive. Biopsy studies have so far been carried out in too few cases to provide any results.

Though the clinical evidence of the action of arsenamide in the destruction of adult worms was more satisfactory it was agreed that in most endemic areas its use was impracticable. Two salts of hetrazan—the hydrochloride and the dihydrogen citrate—were available, of which the latter, containing 53 per cent. of the base, was not universally used.

In view of the data furnished by Dr. G. C. THOORIS and Dr. H. K. BEYE, concerning the marked reductions in microfilarial counts with a single drug treatment once weekly or once each month, it was felt that the Conference could not at this time make decisions on the most favourable regimen from the standpoint of control.

Treatment by desensitization conducted in Tahiti showed that the results with *D. immitis* antigen were encouraging in reduction of number and severity of attacks of lymphangitis. Antihistamine agents produce favourable results in some cases with acute clinical manifestations while penicillin appears to relieve some symptoms.

Dr. H. K. BEYE presented his paper on the control of filariasis in the S. Pacific in which he concluded that the extent of filariasis in any population and the ability of local mosquitoes to transmit the parasite should be the determining factors as to the control measure to be undertaken. It was agreed that mosquito-control measures have so far been shown to be effective in reducing the microfilarial rates. Survey data regarding clinical manifestations, measurements of filarial infection in the human and mosquito populations, mosquito density and breeding, together with general social and economic information, were essential prerequisites before instituting control measures. Because of the special nature of the problems, control measures can best be carried out with full assistance of trained native personnel. Sanitation, insecticides, biological control measures, such as the use of *Megarhinus brevipalpis*, should be applied in each area. Hetrazan appears to be the most easily applicable drug for a control programme because of the ease with which it can be administered.

For the evaluation of measures surveys of clinical signs should be carried out at 5–10-year intervals.

On the educational aspects the Conference recommended that the S. Pacific Commission should serve as a clearing house of educational material on filariasis. Finally the Conference laid down recommendations for the standardization of procedures for the collection, preservation and identification of specimens for the filaria collection of the S. Pacific Commission, which are those generally agreed upon in standard works on this subject and do not require specification. A scheme is also drawn up for the recording of clinical manifestations of filariasis for control purposes. The standards for intradermal tests are also laid down. Whole worm antigen should be used and a dilution of 1/8,000 in physiological saline should be employed. The initial injection should be 0.01 ml. on the basis that large amounts lead to false positive reactions. A similar amount of dog serum should be used as a control.

[The Conference sat at Papeete, Tahiti, from 21st August to 1st September 1951 and from the programme before us it must be admitted that it managed to get through a great deal of solid work. It is therefore to be hoped that, not only will its recommendations be carried out throughout the vast area of the Pacific and its myriad islands, but that the results may be equally satisfactory and

encouraging. The work to be done is prodigious and should absorb the energies of many investigators for many years to come. Their programme is ambitious and it is refreshing to realize that at last concrete steps are to be undertaken to control this scourge. The reviewer is fully conscious of the intricacies of this problem which become more apparent the further this subject is pursued.]

Philip Manson-Bahr

MARKS, Elizabeth N. **The Vector of Filariasis in Polynesia: a Change in Nomenclature.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 137-40. [16 refs.]

The group of "*Aedes scutellaris*" has a wide distribution from the Eastern part of the Asiatic continent through the Malay region and eastward to islands in the Pacific Ocean, where the species generally referred to as *A. pseudoscutellaris* is the vector of the non-periodic filaria of man. This infection has been the subject of much work in Fiji, Samoa and elsewhere in Oceania.

The author, working in England, maintained a colony of mosquitoes of a strain from Fiji and found that, in certain small particulars, they were not identical with *pseudoscutellaris* in the hitherto accepted sense. The differences, though small, were constant, and she was driven to the conclusion that they were sufficiently important to be regarded as specific. The resemblances between the species are so close that past confusion is in no way surprising.

It was unfortunate then that the species represented in the colony in the laboratory is identical with Theobald's original type of *pseudoscutellaris*, all specimens of which, up to the present, have come from Fiji and nowhere else. On the other hand, the widely spread, much studied, vector of filariasis has no valid name, and is here distinguished as *Aedes polynesiensis*. Specimens have been identified from Fiji, Samoa, the Society Islands, the Marquesas Islands and from several atolls of the Ellice group, etc.

The points of difference between the species are given as follows:

A. pseudoscutellaris (Theobald)

Scutal angle with a patch of pale narrow-curved scales, very rarely fewer than five, and usually extending in a somewhat indefinite line along the antero-lateral margin of the scutum.

Basal lobe of male coxite simple, with setae extending nearly to base dorso-laterally and a row of three to five (rarely two or six) stout specialized setae dorsally.

A. polynesiensis sp. nov.

Scutal angle and antero-lateral margin of scutum entirely dark-scaled, or, at most, two or three pale narrow-curved scales on scutal angle (two in holotype).

Basal lobe of male coxite simple, with setae extending nearly to base dorsally but without stout specialized setae. In addition slight differences have been detected between the larvae.

[It is unfortunate that we shall be compelled to use this new name *polynesiensis* for the vector of the non-periodic filaria of Oceania. But the case has been carefully worked out and clearly stated, and we have no choice but to accept the conclusion.]

P. A. Buxton

HUGHES, M. H. & DALY, P. F. **Onchocerciasis in the Southern Gold Coast.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, No. 2, 243-52. [28 refs.]

A new focus of onchocerciasis was discovered at Agbotia, on the east bank of the Volta River, S. Gold Coast, about 70 miles from its mouth.

Sixty-two volunteers from this village were examined for *Onchocerca* nodules, hydrocoele, elephantiasis, gross naked-eye ocular defects and microfilariae in the skin. These last were found by the technique of D'HOOGHE [this *Bulletin*, 1934, v. 31, 810], modified by WANSON, HENRARD and PEEL [*ibid.*, 1946, v. 43, 233]. It is only by this method that the microfilariae of *O. volvulus* can be differentiated with certainty from those of *Dipetalonema streptocerca* and of *Acanthocheilonema perstans* which frequently appear in skin capillaries. Nodules were situated mainly upon the chests and iliac crests of sufferers, but were present on the heads of four children and one adult. Evidence of onchocerciasis was found in 51 persons.

Forty out of 51 onchocerciasis patients were afflicted with lichenification, elephant skin, crawl-crawl or keratoderma. A better term is, perhaps, "presbydermia", a term employed by COLBOURNE, EDINGTON and HUGHES [*ibid.*, 1951, v. 48, 685]. It is important to note that a similar condition, though of milder degree, is seen in streptocerciasis. Some 22 per cent. of those with onchocerciasis showed recognizable lesions of the anterior chamber of the eye and of these 3 were completely blind.

The sub-chieftdom of Atimpoko was next chosen for study; this consists of several small hamlets scattered along the banks of the Volta.

The great majority of the population was investigated, namely 78 men, 35 women, 29 boys and 21 girls. Among these 163 no case of elephantiasis was discovered and a skin smear was made from the scapular region of each. Onchocerciasis was present in 68.1 per cent. Microfilariae of *D. streptocerca* were found in 5, three times in association with *O. volvulus*.

In 29.1 per cent. with positive skin smears the authors were unable to find a palpable nodule. Probably, as suggested by VAN DEN BERGHE [*ibid.*, 1937, v. 34, 468; *ibid.*, 1943, v. 40, 162] and NETTEL [*ibid.*, 1942, v. 39, 572], the adult worms were not encapsulated.

In all groups those with palpable nodules showed higher mean counts of microfilariae in the skin than those without, suggesting that the majority of fecund *Onchocerca* worms are contained in nodules.

The sites of all nodules were recorded as follows:—

Chest wall	...	...	27	per cent.
Knees	...	...	23	" "
Iliac crests	...	...	18	" "
Femoral trochanters			16	" "
Head	...	...	6	" "
Sacrum	...	...	5	" "
Scapula	...	...	5	" "

Presbydermia was present in 87 out of 103 people with skin microfilariae, but 31 (51.6 per cent.) of those with negative skin smears also showed presbydermia. It is difficult to imagine how any resident in an endemic area can entirely escape infestation.

One youth of 18 was afflicted with marked desquamation of the skin and was first recorded as a severe case of nutritional crazy-pavement dermatosis, but proved to be one of heavy infestation with microfilariae of *O. volvulus*. As similar appearances are seen in patients treated with banocide the condition may be an allergic reaction.

Ocular examinations were undertaken in 83 of 103 with microfilariae of *O. volvulus* in the skin. Microfilariae in the eye were sought by conjunctival biopsy, and also with the aid of slit-lamp and corneal microscope.

Microfilariae of *O. volvulus* were identified in the aqueous humour of one of both eyes of 35 people, 23 of whom showed microfilariae in conjunctival

biopsy. Biopsy was also positive in another 12 in whose eyes no microfilariae were detected with the slit-lamp. Thus 47 out of 83 had microfilariae in the eyes.

Twenty had normal vision, 8 were below British blind standard and 4 were totally blind.

Ocular lesions were present in 61.7 per cent. of those with ocular microfilariae and in 22.3 per cent. of control group, suggesting that many of the lesions were indeed due to microfilariae.

The mean skin microfilarial count of those having microfilariae in their eyes was 31.5 compared with a mean count of 9.0 in the control group, suggesting that ocular infestation is usually associated with heavier skin infestation.

It was found that most of the ocular lesions were in persons between 30 and 40 years of age. A variety of abnormalities were noted in ocular onchocerciasis, including atrophy of iris pigment, nummular interstitial keratitis, choroidoretinitis, secondary and primary optic atrophy and others. The authors believe that the lesions were mostly due to onchocerciasis, with the exception of persistent pupillary membrane and epithelial pigmentation—which may be due to deficiency of vitamin A. The authors have also observed that microfilariae may be found in the optic nerve associated with inflammatory changes of the nerve head.

The only known vector of onchocerciasis on the lower Volta is *Simulium damnosum*, which breeds throughout the year in the rapids. This insect shows a maximal seasonal prevalence from June to November. It was noted that it bit Africans in preference to Europeans, and the efficacy of dimethyl-phthalate as a repellent was confirmed.

It appears probable that nutritional factors may play an important part in determining what part of the eye shall succumb first to the presence of microfilariae. The lesions observed at Atimpoko were, like those described by BRYANT [this *Bulletin*, 1935, v. 32, 650], mainly in the posterior segment of the eye, and particularly in the optic nerve, suggesting that a deficiency in the vitamin B complex may have been present, although the authors failed to note any gross clinical manifestation of such a deficiency.

Philip Manson-Bahr

BURCH, T. A. Prurito producido por el Hetrazán como una prueba de diagnóstico para la oncocercosis. [**Pruritus following the Use of Hetrazan as a Diagnostic Test of Onchocerciasis**] Reprinted from *Rev. Colegio Méd. de Guatemala*. 1951, Jan., v. 2, No. 1, 53-7. [12 refs.]

The distribution of onchocerciasis is uncertain, nevertheless it is important that it should be known because there is need for determining the existence of at present unknown foci, as treatment by recent methods is fairly satisfactory. Present diagnostic methods are not altogether satisfying and are, in many cases, used only in the late stages of disease. Serological tests need experts to prepare the antigen and to carry out the tests.

It was observed that of 140 patients with onchocerciasis treated with hetrazan in doses of 0.1 to 0.4 mgm. per kgm., 135 complained of pruritus in the early days of treatment, whereas of 322 with Bancroftian filariasis comparably treated only four suffered from pruritus.

The author then tested 58 onchocerciasis patients and 57 controls, giving them hetrazan, by mouth, 0.3-0.5 mgm. per kgm.; 51 of the former suffered from pruritus but only one of the latter. Various groups of persons were similarly tested and the author concludes that the oral administration of hetrazan, approximately 0.5 mgm. per kgm., causes pruritus in patients with onchocerciasis and that this is a simple and trustworthy test of infection.

H. Harold Scott

GONZÁLEZ BARRANCO, Dolores. Estudio experimental sobre la acción de la luz en las microfilarias de *Onchocerca volvulus*. [**Experimental Study of the Action of Light on Microfilariae of *Onchocerca volvulus***] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 133-6.

The English summary appended to the paper is as follows :—

"It has been reported (*loc. cit.*) that microfilariae of *Onchocerca volvulus* exhibit under experimental conditions a positive phototropism. In our experiments we have been unable to find such action of the light."

[See also this *Bulletin*, 1931, v. 28, 684.]

DEJOU, L. & CAMAIN, R. Localisation péritonéale d'un ver de Guinée avec syndrome ulcéreux gastrique. [**Peritoneal Localization of a Guinea-Worm with Symptoms of Gastric Ulcer**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 438-40.

At Dakar, guinea-worms, calcified or encysted, have been discovered frequently in the following situations :—

(a) paraperitoneal, in the fatty cellular tissue of the iliac fossae in contact with hernial sacs ;

(b) juxta-funicular, along the spermatic cord outside the fibrous coverings ;

(c) juxta-vagino-epididymo-testicular in contact with the testis or tail of the epididymis ;

(d) in the tunica vaginalis, from which the entire worm has been extracted, dead but perfectly preserved, in the sac of a hydrocele.

The discovery of a worm free in the peritoneal cavity, however, is a rarity worth recording. A man, aged about 40, was admitted to hospital complaining of dyspeptic trouble characterized by periodicity and definite localization of the pain ; radiological examination after a barium meal showed spasm of the duodenal bulb. Chronic peptic ulcer needing surgical treatment was diagnosed and the abdomen was explored. Nothing abnormal was found in the stomach or duodenum, but a guinea-worm, dead and partially encysted, was seen in the gastro-colic omentum, nearer to the colon than to the stomach ; about 15-20 cm. of the worm was free in the peritoneum and the tail was embedded in a cyst of the size of an almond in the mesocolon. Worm and cyst were excised with relief of the patient's symptoms. The cyst was found to be full of thick fluid teeming with the microfilariae of *Dracunculus medinensis*. The body of the worm was calcified and the uterus empty. W. L. Harnett

KAO, C. M. & CHOW, Y. L. **The Incidence of Oxyuriasis of Primary School Children in Tientsin, China.** *Peking Nat. Hist. Bull.* 1950-51, Dec.-Mar., v. 19, Pts. 2/3, 267-72. [10 refs.]

"1. A brief survey on *Enterobius* infection among 305 primary school children, 50 college students and 2 families was made and reported.

"2. Of the 305 school children between the age of 7-12 years examined, using the NIH swab only once, 133 or 43·8 per cent were found infected. Of the 50 college students examined similarly only 1 was found infected.

"3. Two families were also examined and it was found that the rate of *Enterobius* infection was very high among family members. In both cases, however, the baby was free from infection, indicating air-borne infection in *Enterobius* is perhaps not very important."

BIOCCA, E. & DI BONA, M. Ricerca delle larve di *Trichinella spiralis* nei diaframmi di individui morti a Roma nel 1950. [Examination of Diaphragms from Autopsy for *Trichinella* Larvae in Rome] *Nuovi Ann. d'Igiene e Microbiol.* 1951, July-Aug., v. 2, No. 4, 321-3.

The English summary appended to the paper is as follows :—

"Examinations of diaphragmatic muscles in 100 routine autopsies from Rome hospitals, during year 1950, have proved negative for trichiniasis."

CH'IN, Y. T. *Trichinella* Infection in Dogs, Cats, Rats, Mice and Pigs in Mukden, China. *Peking Nat. Hist. Bull.* 1950-51, Dec.-Mar., v. 19, Pts. 2/3, 297-300. [12 refs.]

"1. Examination of rats, mice, dogs and pigs for *Trichinella* infection in Mukden was made and is reported.

"2. Two of 96 *Rattus norvegicus*, 6 of 21 dogs and one cat were found naturally infected.

"3. Ninety nine *Rattus rattus*, 107 *Mus speciosus* and 546 pigs were not infected."

SCHWONZEN, T. Über Serumeiweissveränderungen bei Trichinose (unter Berücksichtigung der Elektrophorese). [Serum Protein Changes in Trichiniasis with special regard to Electrophoresis] *Klin. Woch.* 1951, Sept. 15, v. 29, Nos. 35/36, 612-15, 5 figs. [23 refs.]

The investigations described here were made after an outbreak of trichiniasis which affected 30 people in the Düren district of Germany who had eaten infected pork. Eleven patients required hospital treatment and on them the observations were made. Three patients died as a result of circulatory failure. Changes in serum proteins were followed by means of electrophoresis, a method not generally available to the clinician. Starting on the second and third week of illness a marked increase in γ -globulin was noted and reached its peak at the eighth week, the albumin and other globulins being correspondingly decreased. The change in γ -globulin was proportional to the severity of the illness, and proved useful in prognosis. The results obtained by electrophoretic methods were paralleled by those obtained by the Takata reaction. It should be noted that the γ -globulin fraction increases in other diseases and cannot be regarded as a specific feature of trichiniasis, but in the present instance very high values were reached, with return to normal again in 4 to 8 months. These changes in serum protein are superior to other methods, such as degree of eosinophilia, in diagnosis of the condition. The presence of large amounts of antibody, as the result of destruction of the numerous larval forms by the infected host, was recognized by the usual serological methods. These antibodies, with few exceptions, migrate during electrophoresis with the γ -globulin fraction. The electrophoretic pattern of the sera of a number of patients and their albumin, α , β and γ globulin content are recorded.

J. D. Fulton

DEFICIENCY DISEASES

GALAN, P. Contribution à l'étude du problème alimentaire au Hoggar. [Study of the Problem of Nutrition in Hoggar] *Arch. Inst. Pasteur d'Algérie.* 1951, Sept., v. 29, No. 3, 230-43.

A study of dietary habits and deficiencies in a region of Algeria.

SCHNITKER, M. A., MATTMAN, P. E. & BLISS, T. L. **A Clinical Study of Malnutrition in Japanese Prisoners of War.** *Ann. Intern. Med.* 1951, July, v. 35, No. 1, 69-96, 5 figs. [43 refs.]

"From among thousands of Japanese prisoners of war at the 174th Station Hospital, New Bilibid Prison, Muntinlupa, Luzon, Philippine Islands, 24 of the most starved patients were selected for special study. They were divided into two groups, 12 with massive edema and 12 with no edema. Detailed clinical and laboratory studies were carried out over a period of six weeks for comparison of the two groups. Twenty-four apparently healthy Japanese ward helpers were used as controls.

"All of the cases showed loss of weight, wasting, diarrhea, dyspnea and palpitation on exertion, and a few showed limited neurologic symptoms. All had anemia, intestinal parasites, hypoproteinemia, abnormal liver function tests and evidences of improper intestinal absorption. All of the 'wet' cases had hydrothorax and ascites, whereas their absence was striking in the 'dry' group.

"Many other studies, including blood hematocrit, specific gravity, sedimentation rate, urinalyses, stool examinations, blood chloride levels, glucose tolerance tests, basal metabolic rates, urinary creatine, studies of the heart and circulation, viz., circulation time, venous pressure, electrocardiograms, liver studies, such as thymol turbidity and bromsulfalein tests, bilirubin excretion, and renal function tests, failed to elucidate significant differences between the 'wet' and 'dry' cases. The only essential difference in the two groups, and one which we are unable to explain, was a consistently lowered blood cholesterol in the dry group, which returned rather promptly to normal under dietary treatment.

"Despite good medical care and a high calorie, high vitamin diet, including yeast and vitamin supplements, the response of these patients to treatment was slow.

"During the course of the study five of the group of 24 cases died and were autopsied. Six additional cases from outside this special group who died from malnutrition alone also were autopsied, to augment the necropsy material for study. The atrophic changes in tissue, cellular infiltrations, etc. were the same in the two groups, the only difference being the presence or absence of edema.

"From this study we have drawn the following conclusions:

"1. An analysis of the findings does not support our early assumption that these were cases of wet and dry beriberi.

"2. There was no evidence clinically or pathologically of beriberi heart disease or other organic heart disease, nephritis, or venous or lymphatic obstruction to account for the edema.

"3. A number of the patients, both wet and dry, exhibited increasing edema with an intercurrent attack of malaria. On the other hand, control of the malarial attack was frequently associated with diuresis and loss of edema fluid. The reasons for this were not apparent.

"4. The clinical picture was one of nutritional hypoproteinemia, with a spruelike syndrome manifested by marked alterations of serum proteins, with or without edema, with glossitis, diarrhea and marked wasting. These changes were attributed to inadequate food intake, probably with secondary alterations in the gastrointestinal tract which prevented the proper absorption and assimilation of foodstuffs.

"5. With nearly all of the abnormal findings so similar in the two groups, we are unable to explain why some should have had such massive edema and the others none. Possibly differences in sodium intake prior to capture, or in sodium clearance, may suggest an answer."

TEICHMANN, W. Klinische Beobachtungen zum Pellagra-Problem. [Clinical Observations on Pellagra] *Ztschr. f. ärztl. Fortbildung*. 1951, Aug. 15, v. 45, Nos. 15/16, 401-6, 3 figs. [34 refs.]

This article consists of general remarks on the clinical aspect of pellagra based on the author's experience of 15 patients, 12 women and 3 men, seen in the late war and he notes the similarity between these and those recorded by the Russians as occurring during the three years' blockade of Leningrad.

H. Harold Scott

EL KHOLY, M. K. Crime in the Psychoses complicating Pellagra. *J. Mental Sci.* 1951, Jan., v. 97, No. 406, 191-6.

HAEMATOLOGY

ADAMSON, P. B. Haematological and Biochemical Findings in Hausa Males. *J. Trop. Med. & Hyg.* 1951, Apr., v. 54, No. 4, 73-7. [13 refs.]

A haematological investigation among Hausa males in Kano, Nigeria, was carried out in 100 normal controls, 50 prisoners, and 50 persons with tropical ulcers; the results are set out in tabular form.

Points of interest are that the mean haemoglobin levels, 14.30 gm., 14.59 gm., and 12.75 gm. per cent., respectively, are lower than the usual accepted "normals" [e.g., Europeans and Gold Coast Africans, this *Bulletin*, 1948, v. 45, 810] and are lowest among the tropical ulcer cases. The only other outstanding difference between the ulcer cases and others were that in the former the corrected erythrocyte sedimentation rate is 18 mm. in an hour against 4 and 6 mm. in the latter, and the total serum protein was 7.35 against 8.36 and 8.52 gm. per cent. Other deviations from the usually accepted normals noted in all three groups were low red cell counts (4.52, 4.29 and 4.20×10^6 per cmm.), low MCV (76.80, 75.00 and 78.00 cu. μ), high eosinophile percentages (6.36, 8.88 and 8.78) and a low serum albumin (3.51, 2.14 and 3.03 gm. per cent.) with a low albumin/globulin ratio.

Examination of the stools showed ova in about two-thirds of each group, the commonest worms being ancylostomes, which were found in about one-third of the cases.

L. E. Napier

HOLMES, E. G. & GEE, F. L., with the assistance of J. KYOBE. The Blood Counts of Male Africans in and around Kampala. *East African Med. J.* 1951, Aug., v. 28, No. 8, 297-314, 1 fig.

Blood counts were made in 343 male Africans attending the Mulago hospital for various minor, mostly surgical, complaints. Blood was taken from a vein, and red cell numbers, haemoglobin percentages, and packed-cell volumes were determined on a single sample by standard methods. The complaint that brought each patient to hospital, a rough estimate of the diet, as "good" or "bad", the tribe, occupation, age, and the wages of each were recorded.

The mean figures and standard deviations for the whole group were: red-cell count 5.281 ± 0.676 millions per cmm., haemoglobin 15.00 ± 1.75 per cent., packed-cell volume 45.34 ± 4.77 per cent., MCV 86.39 ± 5.89 cu. μ , MCH 28.61 ± 2.75 $\gamma\gamma$, MCHC 33.05 ± 1.85 per cent. In 9 subjects the red-cell count was below 4.00 millions per cmm. The condition that brought each of these patients to hospital was recorded and in no case was it at all likely to have given rise to anaemia.

The means of the red-cell counts, and haemoglobin and packed-cell percentages, were lower than those found by the same authors for Makerere College students [this *Bulletin*, 1951, v. 48, 397] which were, respectively, 5.99 million per cmm., 16.55 per cent., and 49.40 per cent. The difference is in the case of the red-cell counts significant statistically. The means of the red-cell counts in the present series are also lower than those of the "world mean" for the altitude of Kampala. The means of the MCV, MCH and MCHC are within accepted normal limits.

Statistical analysis of the red-cell counts showed that those of "labourers" are lower than those of "cultivators" or of persons of "other occupations": this is true even when the effects of age and diet are eliminated. Among labourers those on a "good" diet have higher blood counts than those on a "poor" diet. There is a negative correlation between red-cell numbers and age.

L. E. Napier

BANTON, A. H. **The Development of Mediterranean Anaemia.** *Arch. Dis. in Childhood.* 1951, June, v. 26, No. 127, 235-7, 2 figs.

Two infants with Mediterranean anaemia, born of mothers with the trait, were examined clinically and haematologically from an early age, from the 3rd and 35th days, respectively.

In the first case, the haemoglobin was 12.7 gm. per cent. (a relative anaemia at this age) and the reticulocytes were 8 per cent.; there were no normoblasts, but there was anisocytosis and poikilocytosis and target cells and ovalocytes were present; and the white cell count was normal. The blood picture suggested the "trait" rather than the disease. By the 85th day all these abnormalities had developed very materially (haemoglobin 6.4 gm. per cent.) and normoblasts had appeared; however, the mother did not consider the child unwell although the liver and spleen were enlarged. By the 158th day the haemoglobin was 3.8 gm. per cent., normoblasts were 262 per 100 leucocytes, and the leucocytes 24,400 per cmm. with the other abnormalities correspondingly increased. The child died of broncho-pneumonia on the 165th day.

The development of the abnormalities was very similar in the second case, except that by the 151st day the haemoglobin was only down to 6.5 gm. per cent. and normoblasts were relatively few.

If the indications of previous work are accepted, namely, that in Mediterranean anaemia the defect is in the red cells and is possibly an abnormal haemoglobin content, the author suggests that this is possibly due to the absence (or deficiency) of some catalyst. A child born of a mother with the trait only would not be born with the fully developed anaemia, since the mother would supply the deficiency, partially, *in utero*, but the anaemia would develop rapidly as the store of this catalyst was exhausted. If this theory is correct a child born of a healthy mother with a father showing the trait would show no anaemia at all at birth. The author has had no opportunity of investigating this point.

L. E. Napier

CHOREMIS, C., ZERVOS, N., CONSTANTINIDES, V. & ZANNOS, L. **Sickle-Cell Anaemia in Greece.** *Lancet.* 1951, May 26, 1147-9, 4 figs.

Sickle-cell anaemia, common in the Negro race, is rare among white people, but numerous isolated instances have been described in persons of Greek and Italian origin. The authors now report a focus of sickle-cell anaemia in a village in Greece (Petromagoula). Twenty-three cases are reported; of these 20 were children and 3 their parents. If 5 cases from a near-by village are excluded, the

incidence in Petromagoula is calculated as 15 children among 6,000 inhabitants or 0.25 per cent. of the population, compared with 0.2 per cent. in the Negro race in the United States.

Twelve cases are reported in detail. The adults were usually free of signs and symptoms but most of the children had painful swellings of the arms and legs, or pains in the bones and joints. The spleen was enlarged in several cases and the liver in nearly all.

In the dry film preparation target cells and ovalocytes were common, and a few sickle cells were encountered in some of the cases. In the wet sealed preparations sickle cells were reported after 24 hours in all, and in one case these were noted after 10 minutes. The anaemia was usually of moderate degree but in 2 cases it was as low as 2,200,000 and 1,800,000 red cells per cmm. The serum-bilirubin was above normal (0.6 mgm. per 100 ml.) in 9 cases and above 1.2 mgm. in 5.

[The evidence that these cases were examples of sickle-cell anaemia and not simply the effects of past (or present) malaria and malnutrition is incomplete: the area was until recently a highly malarious one. This view is also expressed by LEHMANN, *Lancet*, 1951, June 9, 1279; but refuted by one of the authors, Choremis, *ibid.*, 1951, July 14, 80. Further detailed reports are promised and are awaited with interest.]

L. E. Napier

NEEL, J. V., WELLS, I. C. & ITANO, H. A. **Familial Differences in the Proportion of Abnormal Hemoglobin Present in the Sickle Cell Trait.** *J. Clin Investigation*. 1951, Oct., v. 30, No. 10, 1120-24, 2 figs.

"1. Seven Negro families in which the sickle cell trait is present have been investigated by the techniques of electrophoresis with reference to the question of whether there are significant differences between families as regards the proportion of abnormal hemoglobin associated with the trait. These seven families include a total of 74 individuals, of whom 32 are known to have the sickle cell trait and were studied.

"2. The proportion of abnormal hemoglobin observed in individuals with the sickle cell trait varied from 22.3 per cent to 45.2 per cent. An analysis of this variation into two portions, that between members of the same family, and that between family means, revealed a highly significant difference between family means.

"3. This difference between family means is thought to be genetic rather than environmental in origin. However, the nature of the responsible genetic system is not at present clear."

EDINGTON, G. M. **The Sickle-Cell Crisis in Pregnancy: Two Autopsy Reports.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 559-62.

Two young African primigravidae died suddenly at the 28th week of pregnancy after a short severe illness, in which they collapsed suddenly and rapidly became delirious. At autopsy there were very similar findings in each case. Most of the tissues and organs were pale and anaemic, except the spleen which was greatly enlarged (weights 1,422 and 802 grammes, respectively), slatey blue and firm in consistency; the pulp was dark red. The foetuses were a good colour; in one case there were twins whose blood did not sickle and in the other a single foetus whose blood showed 10 per cent. sickling. The section of the spleen showed lakes of sickled blood that largely obliterated the normal structure of the spleen.

The author suggests that death was caused by an acute sickling crisis precipitated by haemoconcentration occurring in the later months of pregnancy and by the additional oxygen requirements of the child causing a relative anoxaemia in the maternal blood.

REID (*W. Afr. Med. J.*, 1936, v. 9, 15) described three cases of unexpected death in African women shortly before or after delivery; the spleens were enlarged and histologically were similar to the author's cases. In each case the sickling trait was found. The present author suggests that there is a syndrome of sudden death in young African primigravidae in which the clinical picture and pathological findings are constant.

L. E. Napier

HELDRIK, F. J., JR. **Sickle-Cell Anemia. Report of a Case in a Newborn Infant.** *J. Pediatrics*. St. Louis. 1951, July, v. 39, No. 1, 90-93, 1 fig. [11 refs.]

"A case of sickle-cell anemia in a newborn Negro female is reported. Previous to this report the earliest reported case occurred in a 19-day-old Negro infant. Jaundice, epistaxis, and familial history prompted the suspicion of a sickle-cell crisis in this patient. Both parents showed evidence of sickle-cell anemia, and the patient's sister, the only other living sibling, is being treated for sickle-cell anemia. The diagnosis was established by laboratory means, and other causes of hemolytic anemia excluded. Response to therapy with whole blood transfusions was gratifying. Weight gain was progressive and adequate. The need for a guarded prognosis is necessitated by the patient's age and the early onset of sickle-cell anemia."

GREEN, T. W. & CONLEY, C. L. **Occurrence of Symptoms of Sickle Cell Disease in the Absence of Persistent Anemia.** *Ann. Intern. Med.* 1951, Apr., v. 34, No. 4, 849-55. [11 refs.]

Several writers have reported sickle-cell disease in which severe and even fatal symptoms of this disease occurred in the absence of the best known symptom, namely anaemia. The authors emphasize the relatively frequency of this occurrence and report 3 cases.

The first case was that of a coloured male steel worker. As a boy he had "rheumatism", aching of knees and thigh. From the age of 26 to 35 he was admitted to hospital on 3 separate occasions for severe abdominal pain and on 2 of them the abdomen was opened. From the age of 35 to 49 he was admitted to the Johns Hopkins Hospital 5 times with symptoms suggestive of an acute abdominal crisis on each occasion. On the first of these his abdomen was opened and the only abnormality was a firm, nodular, slightly enlarged spleen; further investigation showed that his blood sickled in 24 hours: the haemoglobin was 14.0 grammes, the haematocrit 40 per cent. and the icterus index 11. On no subsequent occasion was his haemoglobin ever below 11.7 gm. with haematocrit 35.5 per cent. and it was usually within the normal range. When last seen he was perfectly well and was performing hard work in a steel mill.

The second patient was a man of 22 years apparently of pure Greek origin. He was seen on 5 occasions in the last 2 years, complaining of severe pains in the thighs, wrists, knees, lumbar spine and sternum. The blood showed 100 per cent. sickling in 24 hours. During the attacks the haematocrit percentage varied from 34.5 to 39 per cent. There was no tendency for this to fall during crisis, but between attacks it once rose to 43 per cent.: the leucocyte count sometimes exceeded 20,000 per cmm. When last seen he was completely asymptomatic and the haematocrit reading was 37.5 per cent.

The third case was that of a coloured female of 24 years. The blood count was within normal limits, but sickling was noted in the counting chamber and confirmed in a wet sealed preparation. She had pre-eclampsia in several pregnancies and after delivery an abdominal crisis : after these she was seriously anaemic. On another occasion she had severe pain in the thigh, shoulders and chest associated with moderate anaemia, but a month later she was asymptomatic and the blood was almost within normal limits.

In conclusion, the authors observe that there may be no correlation between the severity of the clinical and pathological manifestations of the disease and the rate of blood destruction. The sickle-cell trait cannot always be distinguished from the sickle-cell disease, and cannot therefore be dismissed as of no clinical importance.

L. E. Napier

BJÖRKENHEIM, G. Neurological Changes in Pernicious Tapeworm Anaemia.
Acta Med. Scandinavica. 1951, v. 140, Suppl. No. 260, 125 pp., 6 figs.
 [Numerous refs.]

This monograph starts with a review of the controversial literature on the pathogenesis of pernicious tapeworm anaemia. The most recent are the opposing views of VON BONSDORFF and of TÖTTERMAN. This is followed by a review of the literature on the neurological disturbances in pernicious anaemia, both "cryptogenetic" [as the Addisonian disease is called throughout] and tapeworm ; that on the latter is very scanty. The author then states the problems that he is attempting to solve ; these he summarizes in the following questions :—

" Do symptoms and signs of changes in the nervous system develop in pernicious tapeworm anaemia, and, if so, how frequently, and how serious is the involvement ?

" How does the disturbance, if present, respond to treatment ?

" Do neurological manifestations appear in tapeworm carriers without pernicious anaemia ?

" What, in a Finnish series, are the findings with regard to neurological involvement in cryptogenetic pernicious anaemia ? "

The study comprises the following cases :—

Pernicious tapeworm anaemia—95 cases.

Cryptogenetic pernicious anaemia—81 cases.

Pernicious anaemia possibly due to infestation with the tapeworm—18 cases.

The investigation was based on the Medical Clinic of the University of Helsingfors, but the patients were admitted to various hospitals in other parts of Finland and examined by the author who visited these hospitals for this special purpose.

Of the 95 patients with pernicious tapeworm anaemia, 75 (79 per cent.) were found to have subacute combined degeneration of the cord, and peripheral nerve degeneration. Paraesthesia occurred in 55 patients ; both upper and lower limbs were involved ; 27 had both numbness and tingling, 25 numbness alone, and 3 tingling alone ; and in 20 cases these caused considerable discomfort. Disturbances in motility and co-ordination (in 40 cases) and impairment of deep sensibility (in 41 cases) were the common findings. In 34 the patient's working capacity was materially reduced on account of the nerve lesion. The lesions were more constant in older patients. Neurological lesions were found in persons who had free acid in their gastric mucosa as well as in those with achlorhydria.

Effective tapeworm treatment caused extensive and often complete remission of neurological symptoms. The administration of vitamin B₁₂ or liver extract effected improvement, but did not produce better results than worm treatment alone, and folic acid caused an exacerbation of symptoms in some cases. In some patients who relapsed progression of the symptoms was observed over a period of a year. In 30 patients with tapeworm but without anaemia, slight neurological symptoms were observed in 10 only.

"Of 81 patients with cryptogenetic pernicious anaemia 70 displayed symptoms and/or signs of subacute combined degeneration of the spinal cord and peripheral nerve degeneration. The most common manifestations were paraesthesia, inco-ordination and subjective and objective disturbances of motility, impairment of postural and vibration sense, and absence of reflexes.

"In over fifty per cent of the cases the patients had been incapacitated by their nervous lesion. Marked incapacity or disability were present in nearly one fifth of the cases.

"The older patients who had suffered repeated relapses displayed severer lesions than the rest."

Comparison of these two groups suggests that while neurological symptoms are equally common to the two groups, these are more severe in Addisonian pernicious anaemia, but the author considers that this difference is because, in the latter, older patients are affected and the disease has been of longer standing.

The author concludes as follows :—

"The neurological response to treatment was more marked in pernicious tapeworm anaemia than in unselected cases of cryptogenetic pernicious anaemia which had been adequately treated during the period of observation. In recent, adequately treated cases of cryptogenetic pernicious anaemia, on the other hand, the remission of the neurological involvement seemed to be as extensive as in patients of the same age suffering from pernicious tapeworm anaemia.

"It is assumed that neurological disturbances in pernicious tapeworm anaemia result when the tapeworm interferes with absorption, and the organism is thus deprived of a supply of neurotropically active substances." *L. E. Napier*

STRANSKY, E. & DAUIS-LAWAS, Domiciana F. **Hookworm Anemia in Filipino Children.** *J. Philippine Med. Ass.* 1950, Dec., v. 26, No. 12, 561-3.

This is a paper based on past experience and recent experience with 15 cases of hookworm anaemia. The authors claim that there are three stages in hookworm anaemia. In the first stage, that of "compensated anaemia", the blood loss and blood formation are balanced, but it is a stage of increased haemopoiesis with bone-marrow hyperactivity and increased reticulocytes in the peripheral blood. In the second stage, the iron and protein intake fail to balance the loss of whole blood and there is hypochromic microcytic anaemia and a greater increase of bone-marrow activity. In the third stage, there is exhaustion of the bone marrow after years of blood loss through hookworm infection with insufficient iron and protein intake; this results in an aplastic anaemia and "panmyelophthisis". [While the first two stages are generally recognized, the proof of the existence of the third stage, which seems a logical one, is wanting; it is not presented here.]

Of the 15 cases presented, 14 were in the second stage and one in the third. No further description is given of this aplastic case, but it is added that the haemoglobin level is not the criterion since in the second stage this may be very low, that eosinophiles and cells indicating regeneration, *e.g.*, reticulocytes and nucleated red cells, are absent, and that this aplastic stage is associated with a haemorrhagic diathesis. [It would have been interesting to have had further details of this case.]

Hypoproteinaemia is usually present but is not striking. The anaemia was hypochromic, mean corpuscular haemoglobin from 11 to 20 $\mu\text{gm.}$, but, they add, rarely it is macrocytic, "as hypoproteinaemia is accompanied by macrocytosis. In our cases with macrocytosis, there is invariably hypoproteinaemia." [This does not presumably refer to the present series.]

Tetrachlorethylene and hexylresorcinol were used in treatment "repeatedly in the same case without being able to relieve the patient of his parasitic ova".

"Besides iron and protein deficiency, multiple vitamin deficiency and secondary infections may be regarded as additional factors. In case of iron deficiency alone, iron therapy has led to fast recovery from all symptoms of anaemia, while the effect of anthelmintic treatment is questionable."

[Yet one must assume that, as the life of hookworms is at least seven years, certain advantages must accrue from their removal, especially if reinfection can be obviated.]

L. E. Napier

EPIDEMIC DROPSY

GOEL, L. N. **Observations on Epidemic Dropsy.** *J. Indian Med. Ass.* 1951, Oct., v. 21, No. 1, 4-10.

This is an interesting account of a carefully studied outbreak among employees of the East Indian Railway in October, 1945. All the cases were traceable to a particular consignment of mustard oil which analysis showed to be contaminated with 10 per cent. argemone oil. A small outbreak had occurred in January of the same year, but was much less serious as the contaminating argemone oil was present only as a trace. Each had been preceded by rains but it is not believed that any aetiological relationship existed therein, unless the scarcity of mustard seeds in winter had led to the crushing of inferior seeds and a mixture of argemone and mustard seeds.

In the October outbreak 476 cases were investigated and, clinically, could be divided into two groups: by far the larger, classed as oedematous, numbered 467 and their symptoms were intestinal with diarrhoea, 4 or 5 to as many as 20 stools daily, for a week or less, rise of temperature to 99°-101°F., and oedema of feet and legs lasting for 1-2 weeks, and patchy pigmentation over the nose and malar bones and the shins and, in some, sarcoid nodules variously distributed. A smaller group, of 9 only, after an initial attack of gastro-intestinal upset with diarrhoea less severe than in the other group, showed nervous symptoms—pins and needles and burning pain in the arms, and less often the legs, with painful muscular cramps and facial flush. Both groups suffered with tachycardia.

As regards age and sex: 331 were adults, 216 males and 115 females; 145 were children from 2 to 12 years of age, 71 boys, 74 girls; infants were not affected for they were not given the oil. The incubation period varied within wide limits, the minimum being one day, the maximum 5 weeks, and the average 7 days. In acute cases death occurred in a few days from cardiac failure; the others recovered in about 6 weeks. Fatal cases were "about 4.4 per cent." [21?]. Diagnosis has to be made from beriberi and nutritional (famine) oedema, but the patients in this outbreak were well nourished and vitamin treatment was ineffectual. Thus, for comparison, 18 patients were given multivitamin tablets and 22 were treated without them. In the former symptoms were relieved in 11½ days (average), in the latter in 10 days. Brief notes of 22 cases are given and a table of the chief symptoms and the proportions in which they were observed.

H. Harold Scott

VENOMS AND ANTIVENENES

DUGUY, R. Recherches sur le venin de *Vipera ursinii*. [**The Venom of *Vipera ursinii***] *Ann. Inst. Pasteur*. 1951, Sept., v. 81, No. 3, 361-3.

The author has tested the toxicity and effects of the venom of *Vipera ursinii*, two specimens of which had been caught in the Department of Vaucluse. Their experiments were carried out with white mice. The venom is colourless at first and white when dried; it is readily soluble in water. For experiment it was used in a strength of 2 mgm. per cc. of physiological saline. Subcutaneously, 0.35 mgm. permitted survival, whereas 0.4 mgm. caused death [only one mouse seems to have been used for each test]. Intraperitoneally, 0.15 mgm. was followed by survival, 0.3 mgm. by death; intravenously, 0.15 mgm. was followed by survival; the author had not enough venom to try higher doses by this route. The venom of *V. aspis* kills rapidly in this dose and subcutaneously the latter is four times as toxic as that of *V. ursinii*. The conditions produced, as verified at autopsy, are similar to those caused by the venoms of *V. aspis* and *V. berus*. These are: haemorrhagic oedema of the skin at the site of injection spreading to the adjacent tissues, congestion and haemorrhagic foci in the peritoneum; congestion of liver and spleen; small haemorrhagic foci in the kidneys, haemorrhages and small infarcts in the lungs. Histologically, there are seen haemorrhagic extravasations in the intestinal serosa, dilatation of the vessels of the kidneys with capillary haemorrhages, haemorrhagic foci in the spleen, periportal congestion in the liver. Further researches are in contemplation when more venom can be obtained. *H. Harold Scott*

SCHÖTTLER, W. H. A. **On the Stability of Desiccated Snake Venoms.** *J. Immunology*. 1951, Oct., v. 67, No. 4, 299-304. [12 refs.]

"The toxic potencies of desiccated snake venoms were tested over a period of up to 13 years.

"It was found that the non-hemorrhagic, so-called neurotoxic venoms had lost little or nothing of their original toxicity in 8 to 9 years of storage in cork stoppered glass tubes in the dark. Hemorrhagic venoms kept under the same conditions had lost 41 to 56% of their power in 9 years and 84% in 13 years (*Vipera*) and 78 (*Bitis*) and only 14 (*Agkistrodon*) % in 8 years. When stored in a frequently opened and re-evacuated desiccator, *Agkistrodon* venoms lost approximately 70% of activity within one year. Under similar conditions, lyophilized neurotoxic *Crotalus* venom lost about one third of its original toxic potency in a couple of months whereas its antibody-binding capacity decreased less markedly, if at all.

"The significance of these observations is discussed."

FOX, W. **Relationships among the Garter Snakes of the *Thamnophis elegans* Rassenkreis.** *Univ. California Publ. Zool.* 1951, v. 50, No. 5, 485-529, 13 figs. [23 refs.]

BALOZET, L. **Propriétés hémolytiques de venins de scorpions.** [**Haemolytic Properties of Scorpion Venoms**] *Arch. Inst. Pasteur d'Algérie*. 1951, Sept., v. 29, No. 3, 200-207. [19 refs.]

According to the author, only a few investigators have studied the question whether the venoms of scorpions are, or are not, haemolytic, and these few have arrived at contradictory conclusions. The author has two criticisms to offer on these investigations. First, that they have looked for "direct haemolysis", ignoring or neglecting the inactivating substance, lecithin, which is indispensable

for the production of the haemolysing substance, lysocithin. Second, they have used sheep's corpuscles, which are known to be more resistant to haemolysis by venom than are those of the horse, guineapig, rabbit or dog. The author has adopted one of two techniques for his experiments: that of CÉSARI and BOQUET and that of KYES. By the former varying amounts of the venom are added to a fixed volume of horse-serum heated to 56°C. and physiological saline is added to make up to 2 cc. The tubes are placed in a thermostat at 37°C. for an hour. There is now added 1 cc. of a 5 per cent. suspension of washed red corpuscles of the horse, the whole well shaken and the tubes placed in melting ice (venom haemolysis, he says, is more rapid at low temperatures). The result is noted at the end of half an hour. By the Kyes technique a series of tubes are used containing varying amounts of venom, a "uniform quantity of the activating substance", 1 cc. of washed red cells, and saline to make up a uniform volume in all tubes. After careful shaking the tubes are placed for 2 hours at 37°C., then for 16-24 hours in a refrigerator at 4°C.

The author has carried out tests with the venoms of *Scorpio maurus*, *Androctonus australis* and *Buthus occitanus*. The venom was obtained by electrical stimulation of the tail, dried rapidly and kept in air-tight ampoules. For the experiments the venom is made up in a strength of 1 per cent. (10 mgm. per cc.) in 5 per cent. glycerinated saline and dilutions are made from this. As a source of lecithin, horse-serum heated to 56°C. was used, or the yolk of egg. It was not found possible to use pure lecithin because it is, itself, strongly haemolytic.

The details of the tests are set out in protocols. It was found that the venom of *Scorpio maurus* contains a phosphatidase which attacks lecithin to produce a haemolytic lysocithin. The activating lecithin is necessary. The venom of *Androctonus australis* and that of *Buthus occitanus* contain no lecithinase and are, consequently, not haemolytic. There seems to be no relation between the haemolytic power and the toxicity of scorpion venom. In fact, the haemolytic *Scorpio maurus* venom is almost harmless for vertebrates, for it was found necessary to inject the venom of 7 scorpions to cause the death of white mice, while the venoms of *Androctonus australis* and *Buthus occitanus*, which are not haemolytic, kill these mice in so small amounts as 1/20th telson for the former and one-half telson for the latter.

H. Harold Scott

BERTIN, V. Consideraciones sobre aracnoidismo en Chile. [Spider-bites in Chile] *Rev. Chilena Hig. y Med. Preventiva*. 1950, Sept.-Dec., v. 12, Nos. 3/4, 37-50. [50 refs.]

This is an interesting account of the spiders of Chile preceded by remarks on spiders in general and the effects of their bites—systemic poisoning and local gangrene. The author states that of several hundreds of spiders in Chile only a small number are dangerous to man and the large hairy spiders, *Mygalidae*, which from their appearance inspire great fear, are not harmful to man. The dangerous species are of the genera *Latrodectus* (*L. mactans*, *L. tredecimguttatus*, *L. hasselti* and *L. menavodi*); *Lososceles* (*L. laeta*); *Lycosa* (the "jumping spider"); *Scytodes* (*S. globula*) and *Ctenus* (*C. fera*). This last is very poisonous and is responsible for most of the fatal cases. It is of large size (30-45 mm.), covered with grey or greyish-yellow short hairs, with a broken dark band on the dorsum, black ventrally, and powerful chelicerae covered with long red hairs. It lives in cellars in which fruit is kept but migrates into adjacent dwellings.

The author describes in minute detail the symptoms resulting from bites by *Latrodectus mactans* with which readers of this *Bulletin* are familiar and the local inflammation and gangrene which spider venom may set up. Of recorded

cases in Chile about 100 papers have been on the gangrenous effects and still more on what the author calls latroductismus. Nothing new is said concerning treatment which is divided into symptomatic and specific by antivenene.

H. Harold Scott

TOBAR, R. G. La anatomia patologica del latroductismo. [**Pathological Anatomy of Latroductus Bite**] *Bol. Informaciones Parasitarias Chilenas*. 1951, Apr.-June, v. 6, No. 2, 20-21. [12 refs.]

The English summary appended to the paper is as follows :—

“The author reports the necropsy finding on an individual 15 years old, who died 32 hours after being bitten by a specimen of *Latroductus mactans*. The manifestations were of acute pulmonary edema. The autopsy showed an intensive edema of the lungs with marked hyperemia of lower lobes, hyperemia of the pia and the brain, extensive edema of the medular pia, hyperemia of liver and kidneys, catarrhal gastritis, dilatation of the gastrointestinal tract and of the gall-bladder.

“No local lesions were found at the bite point.”

DERMATOLOGY AND FUNGUS DISEASES

CLARKE, G. H. V. **Hypertrophic Lichen Planus in West African Negroes.** *Arch. Dermat. & Syph.* 1951, Sept., v. 64, No. 3, 314-19, 4 figs. [Refs. in footnotes.]

“A disease thought to be lichen planus hypertrophicus appears to be relatively common in West African Negroes. Other possible diagnoses, such as quinacrine or amyloid dermatoses, have been eliminated. Some transplantation experiments are described, and the results are in agreement with a virus causation. Local treatment is temporarily effective, and systemic treatment with arsenic, bismuth, or mercury preparations useless.”

MENDIOLA, R. & CORTÉS OCHOA, R. Rinosporidiosis. Primer caso encontrado en México. [**First Case of Rhinosporidiosis Seen in Mexico**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 159-65, 4 figs. on 2 pls.

The English summary appended to the paper is as follows :—

“The authors report the first case of Rhinosporidiosis in Mexico presenting a histopathological study of a nasal polypoid lesion from a male adult resident in the coast of Jalisco and Colima States.”

GEORG, Lucille K., AJELLO, L. & GORDON, M.A. **A Selective Medium for the Isolation of *Coccidioides immitis*.** *Science*. 1951, Oct. 12, 387-9, 2 figs.

In experiments to find a satisfactory culture medium for use in isolating *C. immitis* from materials contaminated by other micro-organisms, the authors used, as their basal medium, “Sabouraud’s dextrose agar” enriched with penicillin (20 units/ml.) and streptomycin (40 units/ml.). On this medium, growth of most of the contaminating bacteria and actinomycetes was inhibited, but mould contaminants vegetated freely.

To make the medium more selective for the isolation of *C. immitis*, actidione, an antibiotic active against many fungi, was added. Comparative tests of the

fungistatic effect of actidione on *C. immitis* and 15 species or strains of common moulds, were made, with three different strengths of the antibiotic in the basal medium; 0.1, 0.5 and 1.0 mgm./ml. respectively. The results of these tests showed that, with the exception of one strain each of *Alternaria*, *Hormodendrum* and *Penicillium*, growth of the moulds was completely or almost completely inhibited by the 0.5 and 1.0 mgm./ml. concentrations while that of *C. immitis* was scarcely affected.

Mixtures of spores of *C. immitis* and the various moulds were sown, with a graduated dilution technique, on 4 plates of the basal medium containing 0.5 mgm./ml. of actidione, and the resulting cultures demonstrated the value of the new medium, *C. immitis* being easily isolated from the 2nd, 3rd and 4th plates.

For heavily contaminated material a concentration of 0.5 mgm./ml. of actidione is sufficient, and the concentration may be reduced to 0.1 mgm./ml. for dealing with lesser degrees of mould contamination.

In a liquid medium ("Sabouraud's dextrose broth"), *C. immitis* could vegetate in the presence of 1.0 mgm./ml. of actidione, and only slight inhibition of growth occurred when the concentration was raised to 2.0 to 4.0 mgm./ml.

Field tests of these media are in progress.

J. T. Duncan

DE ALMEIDA, F., MOURA, R. de A. & MONTEIRO, E. L. Granulomatose paracoccidióidica. Breves considerações sobre a morfologia macroscópica de culturas do *Paracoccidioides brasiliensis*. [Note on Macroscopic Appearance of Cultures of *Paracoccidioides brasiliensis*] *Rev. Inst. Adolfo Lutz*. São Paulo. 1950, v. 10, No. 1, 53-4, 3 figs.

NIÑO, F. L. Siete nuevas observaciones de granuloma paracoccidióidico en la República Argentina. [Seven New Observations of Paracoccidioidal Granuloma in the Argentine Republic] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1950, Oct.-Dec., v. 26, No. 191, 272-305, 39 figs. [14 refs.] English summary (6 lines).

The author describes the clinical histories of 7 cases of paracoccidioidal granuloma (*P. brasiliensis*); 3 in diary form with many details and the others more briefly. All were of the "lymphatico-tegmentary" type of the Brazilian authors, and granulomatous, ulcerating lesions of the mouth and adjacent cavities were a prominent feature. These ulcers, often very destructive, usually involved the dorsal surface of the tongue, the palate (in one case there was an extensive perforation of the palate), the lips, the nares and sometimes the laryngeal area. Cervical and inguinal adenopathies were common, the enlarged lymph nodes, which were usually elastic, freely movable and painless or only slightly tender, ranged from the size of a chick-pea to that of a "nut".

One patient had a generalized, papulo-ulcerative eruption on the skin, particularly on the trunk and face. The lesions were painless, infiltrated, dark-coloured papules surrounded by a white scaly ring, and they measured from a few millimetres to one centimetre in diameter. They were usually ulcerated and crusted. On the soles of the feet the lesions took the form of painful, inflamed ulcers which caused much disability.

Radiography of the chest revealed definite pulmonary lesions in 6 of the 7 patients, which was consonant with the observation of Brazilian physicians that the lung was involved in about 72.09 per cent. of cases of the disease, whereas the earlier authors, who may not have had recourse to radiological examinations, considered that pulmonary involvement was not common. The radiological picture was not characteristic of any particular disease but showed scattered "bread-crumbs" shadows, "micronodular" densities and increased hilar and parahilar shadows.

The paracoccidioidin skin test was performed on 4 of the patients and all gave strong reactions, but they showed no sensitivity to coccidioidin (*C. immitis*).

The diagnosis was usually made by microscopical examination of scrapings from the ulcers in the mouth, lips or nose, or of sections of tissue from these or other lesions, obtained by biopsy. In three of the cases *P. brasiliensis* was found in the sputum. Isolation of the fungus in culture was usually effected by inoculating guineapigs intratesticularly with emulsified tissue from the lesions and then making cultures from the abscesses or granulomata which resulted in the animal's testis.

It is interesting to record that one of the patients was infected in the district of Bahia Blanca, province of Buenos Aires, the most southerly point in the geographical distribution of the infection so far reported. *J. T. Duncan*

MONTEIRO, E. L., DE ALMEIDA, F. & MOURA, R. DE A. Conjunto alanto-corial no estudo de agentes infecciosos. I. Obtenção experimental da granulomatose paracoccidióidica (Blastomicose sul-americana) em ovos embrionados. [**The Chorio-Allantoic Membrane in the Study of Infectious Agents. I. Experimental Production of Paracoccidioidal Granuloma (South American Blastomycosis) in Embryonated Eggs**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1950, v. 10, No. 1, 57-65, 9 figs. on 5 pls. English summary.

Few kinds of laboratory animals are sufficiently susceptible to infection by *Paracoccidioides brasiliensis* to be useful subjects for experiments on the chemotherapy of the relevant disease. The discovery that *P. brasiliensis* is capable of infecting the chorio-allantoic membrane of the developing chick embryo is therefore important.

A culture of the cerebriform type of *P. brasiliensis* inoculated on the chorio-allantoic membrane caused, within a few days, typical granulomatous lesions in which the parasitic spherules of the fungus were present in great numbers. Sectioning was unnecessary for the microscopic study of the lesions on the thin visceral allantois which can be mounted intact and examined in the undisturbed state. Retroculture of the fungus from these lesions was easy, and on suitable culture media colonies developed in 6 days at 37°C. and in 7 days at room temperature. The allantoic fluid caused infection when inoculated into mice.

This technique opens up a new avenue for experimental therapy in connexion with the paracoccidioidal disease and for studies on the morphology of the fungus.

The appearances are shown in a photograph and 8 photomicrographs.

J. T. Duncan

VANBREUSEGHEM, R., VANDEPITTE, J., THYS, A. & WINDEY, W. Premier cas de chromoblastomycose par *Phialophora pedrosoi* chez un indigène au Congo Belge. [**First Case of Chromoblastomycosis Caused by *Phialophora pedrosoi* in an African in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1951, Aug. 31, v. 31, No. 4, 495-9, 3 figs. on 2 pls.

TROPICAL OPHTHALMOLOGY

PUTTANNA, S. T. **Penicillin in Muco-Purulent Conjunctivitis.** *Indian Med. Gaz.* 1951, Feb., v. 86, No. 2, 38-42, 2 charts.

Muco-purulent conjunctivitis is very common in India and occurs in epidemics every year during the summer months, the maximum incidence

being in June, July and August. The author treated 1,105 cases of bilateral conjunctivitis with hourly penicillin drops (5,000 units per cc.) except during the sleeping hours, supplemented with penicillin eye ointment (1,000 units per gramme) applied twice a day. Of these, 701 showed marked improvement in 2 to 3 days and 166 moderate improvement in 4 to 5 days.

In 102 right eye infections, 58 showed marked improvement in 2 to 3 days and 16 showed moderate improvement in 4 to 5 days. In 149 left eye infections, 87 showed marked improvement in 2 to 3 days and 27 showed moderate improvement in 4 to 5 days. Smears from the conjunctival sacs showed that the bacteriological flora were of a mixed type. The clinical results show the decided value of penicillin in muco-purulent conjunctivitis. If after 48 to 72 hours there is no marked improvement, it may be taken that the causative organism is not penicillin-sensitive, but in these cases the penicillin will control the secondary infection and thus lessen the pathogenicity of the causative organism. Detailed results according to sex and age-groups are shown in 3 tables.

E. O'G. Kirwan

ITÔ, Y., ITÔ, T. & SASAKI, Y. **An Electron-Microscopic Study of the Infective Agent of Trachoma.** *Brit. J. Ophthalm.* 1951, Sept., v. 35, No. 9, 553-9, 4 figs.

Saline washings of infected conjunctivae and extracts of various ocular tissues affected by trachoma were clarified by centrifugation and passage through a column of asbestos, and were then absorbed on to a column of kaolin. Sections of the column were broken up in small quantities of saline, the kaolin was removed by centrifugation and the supernatant fluid was examined in the electron microscope. Numerous rounded particles were seen; their diameter ranged from 20 to 300 $m\mu$, with an average value of 180 $m\mu$. They were not found in control material taken from healthy persons. The particles sometimes occurred in groups of 2 and 3; they occasionally had a small protrusion at the end and were surrounded by a membrane which rapidly disappeared when the particles were allowed to stand during the course of preparation. The particles are referred to as Z bodies, and are considered to contain a nucleoid body surrounded by a plasmoid capsule. The different appearances are interpreted as stages in a reproductive cycle. The presence of trachoma virus in the material was confirmed by transmission experiments with 5 human volunteers, 4 of whom contracted the disease. [The appearances are in close agreement with those described by SUGITA and SUGITA (*Bulletin of Hygiene*, 1952, v. 27, 209). Appearances in electron micrographs are not sufficient evidence for the assumption of multiplication by fission; present-day opinion is inclining to the view that a cycle of multiplication takes place by the sudden appearance of fully formed virus after a latent period in which no infectious units can be detected.]

D. J. Bauer

FERRIÉ, J. Essai de traitement des lésions cornéennes du trachome par l'acide trichloracétique. [Trials of Trichloracetic Acid in the Treatment of Corneal Lesions in Trachoma] *Bull. Acad. Nat. Méd.* 1951, v. 135, Nos. 15/16, 274-6.

The treatment of corneal lesions in trachoma by applications of trichloracetic acid is discussed. Applications are made at the limbus or at a little distance from it on blood vessels which supply multiple branches to the cornea. The effect of this is to cause clarification and devascularization of the cornea with improvement of vision and often to a very remarkable extent. Pannus is

also considerably improved. The good results obtained in old cases of trachoma have encouraged the author to use this treatment in early and less severe cases. He also advocates its use before resorting to keratoplasty on trachomatous corneas with dense opacity formation.

E. O'G. Kirwan

TOULANT, P., LARMANDE, A. & TOULANT, M. Essais de traitement du trachome par l'aureomycine et la chloromycétine. [Trials of Aureomycin and Chloramphenicol in the Treatment of Trachoma] *Bull. Acad. Nat. Méd.* 1951, v. 135, Nos. 5/6, 79-81.

Trials of the treatment of trachoma by aureomycin and chloromycetin [chloramphenicol] are discussed by the authors. They used the hydrochloride of aureomycin (which is reported as being more irritating than the borate salt but more stable) in 0.5-2 per cent. drops. The instillations are carried out every two hours and the solution is kept in the refrigerator.

The lachrymation, photophobia and the visual disturbances were rapidly improved, from which it would appear that the virulence of the organism was lessened. The improvement in the trachomatous granules was less marked. The gelatinous follicles were not changed although if they were incised and scraped out cicatrization was accelerated. In pannus the results varied, in some cases rapid improvement occurred but on the complications of pannus in which there was hyperplasia of the tissue aureomycin had no effect. When aureomycin was given by the mouth in doses of 24 mgm. per kilogramme of weight four times a day for several weeks the results were disappointing. More recently the authors used chloromycetin. When it was given by the mouth, 2.50 gm. in 10 doses the first day, then 1.50 gm. for the following ten days, it caused rapid improvement in lachrymation and photophobia but had not much effect on the trachoma follicles. The poor solubility of chloromycetin does not permit it being used locally in the form of drops but instillations of the powder into the conjunctival sac produced excellent results. Powdered aureomycin is more painful, probably because of its very low pH. The great advantage of chloromycetin is its excellent tolerance and in it we have an oral treatment of trachoma, less active but better tolerated than sulphonamide.

E. O'G. Kirwan

MITSUI, Y. & TANAKA, C. Terramycin, Aureomycin and Chloramphenicol in the Treatment of Trachoma. *Antibiotics & Chemotherapy*. New York. 1951, May, v. 1, No. 2, 146-57, 5 figs.

Twenty-two cases of acute trachoma, including 3 experimental instances, 16 cases of typical chronic trachoma, 9 of late-stage trachoma with acute pannus and ulceration of the cornea, and 2 cases of inclusion blennorrhoea of newborn infants, were treated in Japan with the three antibiotics, terramycin, aureomycin and chloramphenicol. Trachoma and inclusion blennorrhoea responded well to treatment with terramycin and aureomycin, but not with chloramphenicol. The efficacy of terramycin seems to be considerably greater than that of aureomycin, at least in the acute stage. The minimum effective dosage of both antibiotics appears to be 0.5 per cent. ointment applied topically three or four times daily. An increase in the frequency of application of these antibiotics may be beneficial in the acute, but not in the chronic stage of the infection.

Acute trachoma and inclusion blennorrhoea within one week of onset may be cured in a period of 7 to 10 days without scarring. Acute trachoma, one to two months after onset, may be cured perfectly in a period of 2-5 weeks. In

chronic trachoma the follicles are more resistant and require 2-3 months' treatment with aureomycin or terramycin before disappearing entirely.

Acute pannus and ulceration of the cornea seemed to be cured in a few days when treated with either of these two drugs.

The results are shown in two tables and the lesions illustrated in 5 figures, mostly photomicrography.

E. O'G. Kirwan

HEAT STROKE AND ALLIED CONDITIONS

TAYLOR, W. H. **Use and Interpretation of the Fantus Estimation of Urinary Chloride.** *Brit. Med. J.* 1951, Nov. 10, 1125-8. [10 refs.]

The author has reported large errors in the estimation by Fantus' method [this *Bulletin*, 1944, v. 41, 76] of urinary chloride when carried out by technicians, house officers and students. A smaller scatter was obtained when the test was performed by the same observer (2-3 gm./litre error in 8 per cent., and 1-2 gm./litre in 42 per cent. of 62 different urines). Too high a result may be caused by urates, bicarbonates, ammonium ions, pH less than 6.5 or allowing urine to stand for 24 hours.

A discussion follows on the value of urinary chloride excretion as an indication of salt deficiency. Urinary Na^+ and Cl^- may be high when these ions are low in blood and *vice versa*, and in 22 such cases (12 hyperchloraemic and 10 hypochloraemic) seen by the author, fallacious therapy would have been instituted if urinary chloride alone had been available. These were mainly severe post-operative surgical cases.

[The Fantus test is of great value in the tropics where (*e.g.*, in ships) facilities for accurate estimation of chloride are not available and where salt deficiency is caused by severe sweating. Values of Na^+ and Cl^- in blood may also be misleading; a complete picture of sodium chloride and fluid distribution is only obtained by blood, urine and probably extracellular fluid estimation. The low urinary excretion (as compared with intake) in lobar pneumonia and many other infections presents a still unsolved problem, and also leads to difficulties of salt replacement therapy in the heat.]

M. L. Thomson

TROPICAL ULCER

POINDEXTER, H. A. **Tropical Ulcers.** *Arch. Dermat. & Syph.* 1950, Nov., v. 62, No. 5, 624-31.

This is a bacteriological study of 400 cases of "tropical ulcer" in Africans in Liberia. Of these, 68 per cent. had solitary ulcers, 77 per cent. of the ulcers were on the lower limbs, 11 per cent. on the buttocks or groin, 9 per cent. on the trunk, and 2 per cent. on the upper limbs. The duration of the ulcers was from 3 months to 10 years and in the case of the old-standing ulcers there was usually a history of partial or complete healing and subsequent relapse. They were usually round, from 1 to 10 cm. in diameter; the edges were fibrotic, irregular and slightly elevated, and the floor was usually periosteum or fascia.

The patients were mostly young adult labourers. The onset was traced to the usual factors, namely, injury from thorns, scratches, etc. (17 per cent.), cuts (21 per cent.), penetration of the skin by helminthic larvae or adults or by arthropods (27 per cent.), and plant and insect dermatitides (13 per cent.).

The bacteriological study included the examination of stained smears, inoculation on plain Loeffler's medium and blood agar incubated aerobically at 37.5°C. and on Sabouraud's glucose agar or corn meal agar incubated at room temperature, and rabbit and guineapig injections to test pathogenicity of isolated strains.

The findings are tabulated separately according as the examination was in the dry or wet season. The most important microorganisms were the staphylococci, *Corynebacterium diphtheriae*, *Trep. vincenti*, with or without fusiform bacilli, and *Candida*.

Although *C. diphtheriae* were present in mixed infections (27 per cent.) during the wet season, they predominated and were present in over half the ulcers in the dry season.

The four standard treatments used were—penicillin, 500,000 units a week, bismuth subsalicylate, 0.25 gm. intramuscularly a week, oxophenarsine [mapharsen], 0.045 to 0.06 gm. intravenously a week, and sulphonamides 2 to 3 gm. locally or by mouth daily for ten days. In addition a small amount of diphtheria antitoxin was available; this was injected locally in amounts of 10,000 to 40,000 units.

Ulcers containing *Trep. vincenti* responded best to the oxophenarsine, and when *C. diphtheriae* were present, the addition of antitoxin to the other forms of treatment was advantageous. When moniliae were present in large numbers the ulcers were very resistant to standard treatments, but "local application of methylrosaniline chloride (1 : 100) and/or potassium permanganate (1 : 1000) dressings" increased the rate of healing.

The author claims that when more specific therapy [about which he was not very explicit] is given, the healing time of ulcers of more than 5 cm. is reduced by 2 to 2½ months as compared with the routine therapy. *L. E. Napier*

MISCELLANEOUS DISEASES

REYNAUD, J. Noma et pénicillothérapie en Afghanistan. [**Noma and its Treatment with Penicillin in Afghanistan**] *Semaine des Hôpit. de Paris*. 1950, May 10, v. 26, No. 35, 1640-47, 4 figs. [17 refs.]

The author had seen about 30 cases of noma in the past 2 years. This paper is concerned with 19 cases, but he says that adequate treatment was prevented by many factors related to the population among which he was working. Noma is nearly always secondary to some infectious disease or eruptive fever. It was never seen in the newborn, or before the eruption of the first teeth, but usually in children aged 2-10 years. Most severe cases occurred between the ages of 18 months and 3 years and were probably related to nutritional difficulties associated with weaning, which is rather delayed in the East.

Noma differs from gangrenous stomatitis in that it is a unilateral ischaemic necrosis related to an initial infective arteritis or thrombosis, and usually commences in the mucosa of the cheek but may sometimes start in the lips in relation to the incisors. Anaemia and leucocytosis are usually present.

Penicillin therapy changed a mortality of 80 per cent. to a recovery of 52 per cent. but the mutilation remaining was often gross, and adequate surgical repair was made difficult by the poor quality of the scar tissue, the gross destruction of the soft tissues and the age of the patient. In young children death was often due to the other conditions. The dose of penicillin ranged from 100,000 units in one injection in a child aged 8 years to 1,800,000

units in 7 days in a child aged 9 years. Brief notes are given of the 19 cases and the illustrations well show the difficulties that start when the active destructive process has been stopped.

C. J. Hackett

ROY, D. M. **A Note on Field Investigation of an Outbreak of Lathyrism in Madhya Pradesh in 1945.** *Indian Med. Gaz.* 1951, June, v. 86, No. 6, 263-5, 2 figs. on pl.

A severe outbreak of lathyrism affecting mainly four districts in Madhya Pradesh in 1945 afforded an excellent opportunity for a field study of the disease. In these districts 8,304 cases were observed; in Chhindwara 2,775, in Sagar 2,108, in Jabalpur 1,864, in Hoshangabad 1,557; in addition there were 105 cases in Bhandara and 18 in Bilaspur, a total of 8,427 cases.

In 1945 cereals became costly and labourers were paid largely in kind with gajra, which is a mixture of wheat, chana and teora. The last-named is the local designation of *Lathyrus sativus* of which there are two varieties, the large called lakh or teora, and the small called lakhori or teori. Both varieties may cause the disease. Those labourers who were paid in cash would often buy teora because of its cheapness. Those attacked were chiefly young adult males and the onset was usually sudden and the time of year was the latter part of the rainy season, August, September and October. The teora crop is hardy and withstands adverse weather conditions which damage wheat crops, so that not only do the two grow together but the former often outgrows the latter.

The author considers in turn the current theories as to the causation of lathyrism: (1) Contamination with *Vicia sativa*; but none of the samples examined at the Imperial Agricultural Research Institute, New Delhi, was found to contain this. (2) Deficiency of vitamin A; this cannot be incriminated, at all events alone, because the same deficiency was present in unaffected districts. (3) Deficiency of vitamin B; epidemiological and experimental investigations failed to show that this played any part in the outbreak. Vitamin B was tried in treatment of patients but yielded no appreciable benefit. (4) *Lathyrus sativus*. Only those who consumed teora in large proportion, 40 per cent. or more, of their diet for at least 6 months were attacked. Thirty per cent. level would seem to be a safe limit. Tests were made to test husk-toxicity, but those eating husked teora were affected equally with others. Whether the toxin, whatever it be, is destroyed by boiling was not determined, as prolonged feeding experiments in man or animals, or both, would be needed to test this. Similarly, the ability of ajowan (*ptychotis*) to neutralize the toxicity of *Lathyrus* could not be verified.

H. Harold Scott

PROTOZOOLOGY: GENERAL

OTTEN, E., WESTPHAL, A. & KAJAHN, Elisabeth. Zur Epidemiologie der Toxoplasmose. Der Hund als Infektionsquelle des Menschen. [**Epidemiology of Toxoplasmosis. The Dog as Source of Human Infection**] *Klin. Woch.* 1951, May 15, v. 29, Nos. 19/20, 343-6. [11 refs.]

In view of the absence of host-restriction in *Toxoplasma*, infection with this parasite is regarded as a zoonosis in which a number of wild and domestic animals might act as reservoir hosts. The present paper deals with the rôle of dogs in the epidemiology of human toxoplasmosis. Using the dye-test, the authors have detected among 122 Hamburg dogs—selected chiefly on account

of the presence of characteristic symptoms—49 cases of toxoplasmosis. A further investigation of 50 cases revealed 10 per cent. of infected animals : on the whole the authors estimate that from 2 to 5 per cent. of Hamburg dogs are affected. Among the infected dogs the disease was latent in 5 cases, while the others showed symptoms of neurosis, paresis, tonic-clonic convulsions and gastritis.

The relationship between canine and human toxoplasmosis was investigated by a serological examination of human contacts (owners of the dogs, their families and neighbours). Of 38 persons intimately associated with 23 infected dogs, 23 reacted positively to the dye-test (with titres from 1 : 25 to 1 : 400). In 5 owners, who were tested within 8 days after clinical symptoms manifested themselves in their dogs, the reaction was negative. The authors have also correlated the clinical findings in the dogs with the incidence of infection in man. In the case of dogs with a chronic infection, showing nervous symptoms, 2 out of 6 human contacts had a positive reaction, while in the case of dogs with an acute form of the disease, manifested by profuse diarrhoea, 6 out of 8 human associates reacted positively. Finally, among 11 persons, who were in contact with dogs suffering from the mixed form of the disease, 10 were positive. Canine toxoplasmosis with diarrhoea is regarded as being particularly important in the transmission of the disease, in view of the presence in such cases of necrotic lesions of the rectum. It is concluded that dogs play an important part, as sources of infection, in the epidemiology of human toxoplasmosis.

C. A. Hoare

OTTEN, E., PIEKARSKI, G. & WESTPHAL, A. Die Bedeutung der Toxoplasmose für die Veterinärmedizin. [**The Importance of Toxoplasmosis for Veterinarians**] Reprinted from *Deut. Tierärztl. Woch.* 1951, Jan. 15, v. 58, Nos. 3/4, 24-6. [26 refs.]

THALHAMMER, O. Der Stand der Toxoplasmoseforschung in Wien. [**Toxoplasmosis Research in Vienna**] *Wien. klin. Woch.* 1951, Aug. 10, v. 63, No. 32, 565-9, 2 figs.

During the last few years it has been shown that toxoplasmosis is of fairly considerable importance as a human disease in Austria. This paper draws attention to the nature of the disease and records the investigations which have been carried out in Vienna.

Most frequent as a disease of sucklings infected during intra-uterine life through latent infection in the mother, causing also abortion and premature birth, toxoplasmosis may occur at any age whether in human beings or in animals. A full description is given of congenital toxoplasmosis—enlargement of liver and spleen, lung changes and the signs of encephalo-myelo-meningitis which may lead to a multiplicity of grave permanent changes in the central and peripheral nervous system. Signs and symptoms of the disease in adults are also described.

The main purpose of this paper is to describe at some length the results of testing sera from apparently uninfected persons, by the Sabin-Feldman test and the toxoplasmin skin test of Frenkel. These tests are first discussed in respect of their agreement with one another. Agreement was found in nearly 100 per cent. of the sera examined.

A total of 1,289 tests were performed, of which 1,074 were skin tests. The results of 1,006 tests showed that there is a progressive increase in the percentage of positives with advancing age. There were no positives in 61 tests of the under 5 age-group, but at 6-10 years the percentage of positives was 10 (90 tests) rising at age-group 41-50 years to 78.9 per cent. (85 tests). The

overall percentage of positives was 46.1 in 1,006 tests. After the age of 20 years the number of positives in females was found to be about 10-15 per cent. higher than in males.

The specificity of the tests is discussed and it is believed that they have high specificity and that the tests therefore indicate widespread infection of the population. Sources of the infection are infected animals of many kinds, and a history of association with sick dogs and cats is frequent in many severe cases. Milk infection is also possible as the protozoon has been shown to be excreted in the milk of cows. The author found that 5 out of 34 cows gave positive tests.

M. E. Delafield

STUERMER, V. M., STEIN, R. J. & RANDALL, J. H. **Incidence of Toxoplasmosis among Pregnant Women in Iowa.** *Iowa State Med. Soc. J.* 1951, July, v. 41, 248. [Summary taken from *J. Amer. Med. Ass.* 1951, Oct. 6, v. 147, No. 6, 601.]

During a short period in 1949 and 1950, 152 pregnant women, aged 23.5 on an average, admitted to the maternity service at the State University of Iowa, were tested for toxoplasmosis, with the skin, neutralizing antibody, complement fixation, and methylene dye reduction tests. Careful obstetric histories were taken. About half the group was nulliparous at the time of testing, but most of the patients were delivered during the period of hospitalization and observation. Of the 152 women, eight gave positive reactions to the tests, showing an incidence of subclinical toxoplasmosis of 5.26 per cent. The results of all four methods of testing correlated well. The neutralizing antibody test seems to be the most consistent indicator, although the skin test is a reliable indicator in this type of survey. In addition to the obstetric patients tested, seven infants were given skin tests to determine whether this method of testing would be deleterious to an infant. No untoward symptoms were noted nor were any positive reactions recorded.

RODHAIN, J. & GEREBTZOFF, M. A. Au sujet de la membrane limitant les pseudokystes des toxoplasmes. [**The Membrane Surrounding the Pseudocyst of Toxoplasms**] *C. R. Soc. Biol.* 1951, May, v. 145, Nos. 9/10, 766-8, 2 figs.

In a previous paper [this *Bulletin*, 1950, v. 47, 1226] it was suggested that the membrane surrounding pseudocysts of toxoplasms found in the brain of infected mice was produced by the parasite itself, on account of which these structures were true cysts, rather than "pseudocysts". The authors have re-investigated the question regarding the nature of these structures in brains of infected mice fixed with formalin-ammonium bromide and stained by Rio Hortega-Kanzler's silver carbonate method. The examination of preparations of these brains showed that the membrane investing some of the agglomerations of toxoplasms had an affinity for ammoniacal silver carbonate, and revealed the characteristic filamentous processes of the microglia cells. From these findings it is concluded that the membrane is undoubtedly produced by the host-cell, and the agglomeration of parasites enclosed within it should therefore be regarded as a pseudocyst.

The pseudocysts, which are present in chronic infections, persist for long periods of time, especially in the brain of infected animals (including man). It is suggested that the membrane protects the parasites against the antibodies produced by the host, while the free parasites are eliminated by them. On the other hand, the membrane is evidently permeable to substances necessary for the subsistence of the enclosed parasites.

C. A. Hoare

VERLINDE, J. D. & MAKSTENIEKS, O. **Repeated Isolation of Toxoplasma from the Cerebrospinal Fluid and from the Blood, and the Antibody Response in Four Cases of Congenital Toxoplasmosis.** *Antonie van Leeuwenhoek : J. Microbiol. & Serol.* 1950, v. 16, No. 5, 366-72. [10 refs.]

Four cases of toxoplasmosis in infants are reported. All the infants were 1 to 3 weeks premature ; they showed hydrocephaly, cerebral calcifications, microphthalmia and chorio-retinitis. In each the clinical diagnosis was confirmed parasitologically by recovery of toxoplasms from the ventricular fluid, on several occasions, in 3 cases, and from the blood in 3 cases. In the ventricular fluid, *Toxoplasma* was demonstrated by a direct smear of centrifuged fluid, as well as by mouse inoculation.

Antibodies were demonstrated by Sabin's dye test and by the complement-fixation test ; the antigen for the latter was obtained from the chorio-allantoic membrane of chick embryos inoculated from the centrifuged deposit of the peritoneal exudate of an infected mouse.

Two infants died at 23 and 43 days and at post-mortem examinations numerous necrotic granulomatous areas were found in the brain substance, especially in the brain substance lining the lateral ventricles ; these areas were packed with *Toxoplasma*.

In 3 cases, antibodies were present in rising titre up to the end of the second month, from 1/256 to 1/4,096, 1/4 to 1/512, and 1/2,048 to 1/4,096, respectively, for the dye test, and from 1/2 to 1/32 and 0 to 1/32 for the complement-fixation test, in the first and third cases whereas in the second case the latter test was negative throughout. The fourth infant only lived about three weeks and tests were not recorded.

The mothers of all 4 infants showed positive serum tests, again in rising titres ; the dye test rose to 1/4,096 in two cases and to 1/8,192 in the other two, whereas in the fathers and siblings it was never above 1/20.

The histories of the mothers throw little light on the aetiology except that 2 mothers prepared hare for a meal in the latter part of pregnancy ; the hare is a potential carrier.

In addition the serum tests were carried out in 600 apparently healthy persons ; of these, 64 gave positive results (1 in 100 to 1/8,192) with the dye test, and with the complement-fixation test 1 in 2 to 1 in 256. *L. E. Napier*

FRANKE, H. & HORST, H. G. Zur Frühdiagnose und Therapie der Erwachsenentoxoplasmose. [**The Early Diagnosis and Treatment of Toxoplasmosis in Adults**] *Deut. med. Woch.* 1951, Aug. 31, v. 76, No. 35, 1049-52. [52 refs.]

The literature of toxoplasmosis up to 1947 dealt mainly with the disease as it occurs in infants at birth and in the early years of life, for out of 72 recorded cases only 7 were in adults. Since 1947, however, a number of authors have described cases in adults but in most instances the diagnosis was based on serological or skin tests and not on the demonstration of the causative protozoon.

The value of these tests is considered. Skin tests with toxoplasmin are not specific, and complement-fixation and neutralization tests are unsatisfactory. Of all the tests that have been tried the test of Sabin and Feldman has been regarded as of most value. One of its disadvantages is that it is not positive in the early stages of the acute disease and particulars are given of an undoubted case of toxoplasmosis in which the test did not become positive until after 8 weeks of illness.

In this case of the disease and in 10 others to which reference is made, diagnosis was established by demonstration of the causative organism. This is

clearly the best method for early diagnosis. Particulars are given of the technique adopted and there is a page of illustrations of the protozoon isolated from cerebrospinal fluid and from the skin at the site of the typical rash. The protozoon has also been found in the blood and in the fluid aspirated from lymphatic glands.

Clinical particulars of some acute cases are given—the general state, the rash, signs of meningitis, increase in the number of cells in the cerebrospinal fluid, the retinal changes and the X-ray picture of the skull.

The treatment which gave good results in 6 acute cases, after penicillin and streptomycin had been ineffective, was the intravenous injection of Solu-Supronal. This preparation consists of a neutral watery 20 per cent. solution of Supronal, the name given to equal parts of 2-p-aminobenzol-sulphonamido-4-methylpyrimidine and 4-aminobenzol-sulphothiocarbamide salt of 4-amino-methylbenzol-sulphonamide. It was given in a total daily dose of 8 gm. for 6 days in one of the cases with very rapid good results. Other authors have written of the value of sulpha-pyrimidine in treatment. *M. E. Delafield*

STEINBRINCK, W. Toxoplasmose. Hypophysär-diencephale Krankheitsbilder als Ausdruck toxoplasmogener Defekterkrankungen. [**Toxoplasmosis. Changes in the Hypophysis and Diencephalon in Toxoplasmogenic Deficiency Diseases**] *Med. Klin.* 1951, Nov. 9, v. 46, No. 45, 1183, 2 figs.

This short paper records the X-ray findings of abnormal calcification in the skull (photographs are reproduced) in 2 patients, both of whom presented evidence of endocrine imbalance and in whom serological tests were positive for infection with *Toxoplasma*. *M. E. Delafield*

FANKHAUSER, R. Toxoplasmose beim Hund. [**Canine Toxoplasmosis**] *Schweiz. med. Woch.* 1951, Apr. 7, v. 81, No. 14, 336–8. [38 refs.]

The author has traced, in the literature of the last forty years, 40 cases of toxoplasmosis in dogs from different countries. To these are added 8 cases observed by him in Switzerland in 1950, in young bitches from 4 months to 2 years old. The clinical symptoms in these animals vary and may be mistaken for atypical forms of distemper. In general, they are characterized by prolonged fever (39–40°C.), loss of condition accompanied by emaciation, gastro-enteritis with vomiting and diarrhoea, pneumonia, and manifestations of impairment of the central nervous system. The main histopathological changes consist of inflammatory processes in the heart muscle, lungs, liver and other organs, but especially in the brain and its membranes. Other characteristic features of the disease are capillary blockage and necrotic foci. The latter are of microscopic dimensions in the liver, pancreas and spleen, but in the cardiac muscle, lungs and brain they reach several millimetres in diameter. In the case of gastro-enteritis, there is ulceration of the intestinal wall and haemorrhage. In the affected organs the parasites are found free or within the cells (pseudocysts).

It is concluded that, since of all domestic animals the dog is most frequently infected with *Toxoplasma*, it probably represents an important source of human infection. *C. A. Hoare*

VANĚK, J. Atypická ("intersticiální") pneumonie dětí, vyvolaná *Pneumocystis carinii*. [**Atypical ("Interstitial") Pneumonia in Infants caused by *Pneumocystis carinii***] *Časopis Lékařů Českých*. Prague. 1951, Sept. 21, v. 90, No. 38, 1121–4, 17 figs. (14 on pl.) English summary.

Between 1945 and 1951 the author observed at autopsy 16 cases of an atypical pneumonia of infants which resembled the condition described by AMMICH

(*Virchows Arch.* 1938, v. 302, 539-54) as interstitial non-syphilitic pneumonia. The age of the infants ranged from 67 to 131 days. The course of the disease was mainly apyrexial with dyspnoea and intense cyanosis ; extensive shadowing was seen on X-ray examination of the lungs. The duration of illness in 10 cases was from 4 to 13 days. Four patients were already ill when admitted ; the remaining 12 infants developed the illness when already in hospital for other reasons ; 8 of them were premature, and 5 were one of twins. Three showed severe congenital malformations (of central nervous system, heart and palate) and one had erythroblastosis foetalis. Four cases occurred in infants in the same ward ; one of these recovered. At autopsy the lungs were found to be distended and did not collapse ; the pleura was slightly thickened, and the cut surface of the lung was grey and airless with thickened interlobular septa. Both lungs were affected equally. On microscopical examination the septa were found to be thickened and infiltrated with leucocytes and plasma cells : the alveolar epithelium was thickened and desquamated in parts, and the alveoli were filled with cells and exudate and also contained numerous irregularly-shaped bodies. These were better seen in smears stained with Giemsa, and appeared as organisms 2 to 4μ long with cytoplasm and a nucleus, which sometimes occurred in clumps of 8. They were identified as *Pneumocystis carinii*. A case of pneumonia caused by this organism has been described by VAN DER MEER and BRUG [this *Bulletin*, 1944, v. 41, 152], and the condition described by Ammich was probably of the same aetiology. The source of infection in the author's cases was unknown, but the children were housed in old hospital buildings infested with rats and mice which are known to be carriers of the organism.

The paper is illustrated with photomicrographs of the lesions and the parasite.

D. J. Bauer

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

QUTUB-UD-DIN, M. **The Culicine Mosquitoes of Hyderabad-Deccan City and their Bionomics as observed during 1943-45.** *Pakistan J. of Health.* 1951, July, v. 1, No. 2, 26-32, 1 map.

Thirty-six species of Culicine mosquitoes are recorded for the first time from the city of Hyderabad. The city is divided into two parts by the Musi River, which provides many breeding places. Other main breeding places in the modern city north of the river and in the ancient walled city, are described. Near the old city are two reservoirs (" tanks "), one of them partly dried up, and an overgrown public garden. The modern city has as permanent breeding places a drainage canal (the Musheerabad channel) and ponds in the public garden.

The species reported are of the genera *Culex*, *Aedes*, *Mansonia*, *Ficalbia*, *Uranotaenia* and *Armigeres*. Details of the habitat are given for each species, and, in the case of an unidentified species of *Culex* (*Culiciomyia*) some remarks on its taxonomic characters.

The study was undertaken as a result of unpublished reports of the occurrence of filariasis in parts of the State.

A. J. P. Goodchild

KITAOKA, M., MIURA, T. & OGATA, T. **Seasonal Occurrence of Mosquitoes in Nature in Tokyo 1948 and 1949. Zoophilia of Each Species of Mosquitoes.** *Japanese Med. J.* 1950, Oct., v. 3, No. 5, 331-47, 7 figs. [17 refs.]

The authors have investigated the seasonal incidence of mosquito species in and near Tokyo during 1948 and 1949. This is part of a study of the significance of mosquitoes as vectors of Japanese B encephalitis. A later paper, it is reported, deals with isolation of the virus from the mosquitoes collected and discusses their part in the transmission of the disease.

Mosquito collections were made once every 7-10 days throughout 1948 from stables, a house, and from animal sheds in which a variety of domestic animals were kept together. In 1949, the same stables were used, and also a stable and a cattle shed in the Zoo at Tokyo. Collections with a sucking tube were made of mosquitoes found resting in these premises in the hour before and after sunset.

Culex tritaeniorhynchus constituted over 65 per cent., and *Anopheles hyrcanus sinensis* over 15 per cent. of 10,722 and 18,729 mosquitoes collected in the two years. About 5 to 10 per cent. of the catches were of *Aedes vexans* and *Culex pipiens* var. *pallens*. Species which represented less than 1 per cent. of the collections were: *Armigeres obturbans* (3.2 per cent. in 1948), *Aedes togoi*, *Aedes niveus*, *Aedes japonicus*, *Aedes albopictus*, *Culex bitaeniorhynchus*, *Culex vorax*, *C. orientalis* and *Anopheles koreicus*.

C. pipiens var. *pallens* fed most frequently on man, *C. tritaeniorhynchus* on domestic animals (rabbit, sheep, guineapig, horse, pig and cattle) and *Anopheles hyrcanus sinensis* formed 30 per cent. of the mosquitoes taken in rabbit or sheep pens and 15.2 per cent. of house catches. [These conclusions on the host animals of the different species of mosquito appear to be based solely on the type of premises in which the mosquitoes were found.]

C. tritaeniorhynchus and *C. pipiens* var. *pallens* were most abundant in July and August; *Anopheles hyrcanus* and *Aedes vexans* showed a peak in densities in July with, in August or September, some evidence of a second, but much lower, peak.

The text, which is in unusual and sometimes difficult English, is amply supported by tables and graphs.

D. S. Bertram

SANDOVAL, A. M., BELTRÁN, E. & DOWNS, W. G. Nota sobre la infección experimental del *Anopheles aztecus* Hoffmann. [Experimental Infection of *Anopheles aztecus*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1950, Dec., v. 11, Nos. 2, 3 & 4, 149-52. English summary (5 lines).

- i. BROWN, A. W. A., SARKARIA, D. S. & THOMPSON, R. P. **Studies on the Responses of the Female *Aedes* Mosquito. Part I.—The Search for Attractant Vapours.** *Bull. Entom. Res.* 1951, July, v. 42, Pt. 1, 105-14, 2 figs. on 1 pl. [12 refs.]
- ii. SARKARIA, D. S. & BROWN, A. W. A. **Studies on the Responses of the Female *Aedes* Mosquito. Part II.—The Action of Liquid Repellent Compounds.** *Bull. Entom. Res.* 1951, July, v. 42, Pt. 1, 115-22, 1 fig.

i. This paper, the first of a series on factors attracting mosquitoes to warm-blooded animals, is concerned with tests of the attractive influence of various air-borne vapours and air compositions.

The test insect was *Aedes aegypti*, maintained in populations of 1,000 to 3,000 individuals in a 360 cu. ft. cage (10 ft. × 4½ ft. × 8 ft. high). Blood meals were provided from the human arm or a rabbit periodically; raisins and pot plants provided other food and shelter. Room temperatures varied from 23 to 33°C., and relative humidities from 30 to 60 per cent.

The olfactometer was largely of original design and was suspended for the tests in the centre of the cage. Its main features were as follows : two conical Buchner funnels, set wide end upwards and 16 in. apart on a board, were closed with fine black veiling net. Each netted opening is called a port. A stream of air, or vapour, was fed by tube into the lower stem of each funnel and, passing up through the netting, was sucked away between the funnel and an outer metal sleeve connected in turn with an exhaust tube leading outside the cage. Each port could be supplied with a different air composition or vapour, the required condition being prepared by passing the air or vapour through appropriate apparatus outside the cage. All tests were made with the air or vapours warmed to 37°C. The relative attractiveness of the air or vapours under comparison was assessed by two observers, each of which counted on a tally the number of mosquitoes approaching within 0.5 in. of one of the ports. Counting stopped when 50 mosquitoes had been recorded for one of the ports. Four such observations were made for each comparison, the vapours being interchanged between the ports alternately. The olfactometer tested vapours and air compositions but some tests were also made of dry and moist surfaces with the use of black and white billiard balls covered with black and white fabric which was dry or moistened as required. These balls were mounted in tests on pegs on the olfactometer board in the middle of the large cage.

With the olfactometer, comparisons were made of dry and moist air (relative humidities of 15–20 and about 80–90 per cent., respectively), and of both of these with 10 per cent. CO₂ added. The influence of pure CO₂ was also studied. Note was taken of modifications in the responses of mosquitoes according to the humidity of the general atmosphere of the cage.

The experiments conclude with tests of the attractant quality of the vapours of the following "candidate attractants" : acetic acid, lactic acid, ammonia, trimethylamine, sweat, ethyl alcohol, benzaldehyde, ethyl butyrate, molasses, and beer. These were tested at two concentrations, one a hundred times the strength of the other. Attractancy, in these experiments, was assessed by the number of mosquitoes at the experimental port for every 100 mosquitoes at the control port.

The experiments gave these results. Moist air was 3–5 times as attractive as dry air and a moist surface about 5 times as attractive as a dry one, regardless of whether the object was black or white. Very high atmospheric humidity diminished this preference and sometimes reversed it. The addition of 10 per cent. CO₂ to dry air doubled its attractancy but made no great difference to that of moist air. Pure CO₂ proved as attractive as dry air, less attractive than dry air with 10 per cent. CO₂ content, and about one-third as attractive as moist air.

The experiments with pure CO₂ presented a number of interesting points to be discussed in a later paper. It is an activator and exerts initially an attractive influence. Although many mosquitoes approach the port, large numbers remained more than half an inch away and were, therefore, not recorded in the type of result dealt with in the present paper. It is, however, suggested that under field conditions CO₂ must be recognized as an attractant.

Sweat was the only chemical substance to exhibit marked attractive power, but in concentrated form, was, like the other substances tested, repellent. Occasionally, there was evidence of some attraction to ethyl alcohol, ethyl butyrate and beer. The view is expressed that, despite these findings, there may be certain concentrations of others of these substances which would be attractive under particular conditions.

There are two photographs of the apparatus and five tables of results.

ii. In the second paper, an account is given of the use of the same olfactometer to assess the relative repellency of several repellents of established efficiency in the field and of numerous other chemical substances. Forty-two different substances were examined. The repellency rating derived for each substance represents the difference between the number of mosquitoes attracted to the experimental vapour for every hundred mosquitoes at the control port. Humid air at 80–90 per cent. relative humidity was used as the control vapour, to which, for the comparisons, was added 10 cc. of the experimental substance in a bead-bubbler preceding the heating helix in the sequence of apparatus leading to the experimental port. The temperatures of the air streams were just above room temperatures of 26–29°C. Atmospheric humidities were of the order of 40–50 per cent. relative humidity.

The results are tabulated into 5 groups of substances according to their repellency ratings. The higher the rating value, the greater the repellent power of the substance. Some of the more interesting substances within the groups are as follows, the repellency rating being shown in brackets after each substance :—

Group 1 : Citronellal (81), n-Hexyl mandelate (80), isobornyl 4-morpholinoacetate (78), DMP-Rutgers 612-Indalone, *i.e.*, 6-2-2 (75), n-Hexyl diethyleneglycol monoether (73).

Group 2 : Oil of citronella (70), Indalone (65), Rutgers 612, *i.e.*, 2-ethyl-hexanediol-1,3 (64), NMRI-488, *i.e.*, phenylcyclohexanol-cyclohexyl cyclohexanol (63), dimethyl phthalate (62), and 8 other substances with ratings from 61 to 67.

The remaining 22 substances are placed in rating groups of 41–60, 30–40, and 25 or less. Repellents in practical use all had ratings over 60 per cent.

The results are discussed in relation to the vapour pressures of the substances at 25°C. and their narcotic power on mosquitoes. Vapour pressures are computed from experimental data and narcotic action was determined from the time required for 80 per cent. of mosquitoes in a cage to be knocked down when suspended in an atmosphere of the vapour under investigation. It is found that a high repellency rating is not necessarily associated with a high vapour pressure value. This is the case, for example, for indalone, dimethyl phthalate and isobornyl 4-morpholinoacetate. Thus it appears that repellency is not merely a measure of volatility. All substances, except 7 including Rutgers 612 and isobornyl 4-morpholinoacetate, had some narcotic effect. These non-narcotics had low vapour pressures except Rutgers 612 and one other substance (repellency 60). There was generally no correlation of vapour repellency and rate of knockdown in the narcosis tests.

Characteristics for a good repellent are a combination of a high vapour repellency rating and a low vapour pressure. The experiments described indicate that these requirements are found in isobornyl 4-morpholinoacetate particularly, and in n-hexyl mandelate, and n-hexyl diethyleneglycol monoether, all of which have given very good results when tested as impregnants in clothing in field experiments. Similar findings apply to 6-2-2 used in applications to the skin.

The very effective repellency of citronellal and oil of citronella is attributed to their very high volatility.

In general, the results obtained in these olfactometer tests confirm observations in which the effectiveness of different substances has been compared by the use of treated arms or legs, or impregnated clothing, as test vehicles.

D. S. Bertram

RESNICK, S. L. & CROWELL, R. L. **Comparative Evaluation of certain High Pressure Insecticidal Aerosols against *Musca domestica*.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 248-56, 4 figs.

The authors have made comparisons between experimental aerosol formulations and an approved aircraft formulation G.382, consisting of 5 per cent. pyrethrum extract (the extract consisting of 20 per cent. pyrethrins), 3 per cent. DDT, 5 per cent. cyclohexanone, 2 per cent. lubricating oil and 85 per cent. freon. A method of evaluation was evolved with the use of modified Peet-Grady chambers and insectary-reared *Musca domestica*. The ratio of 15 to 85 of non-volatile to volatile material was maintained throughout.

Sovacide 544G, an alkylated naphthalene and a good DDT solvent, was used to replace the DDT solvent cyclohexanone and lubricating oil in the G.382 formulation, for the cyclohexanone causes crazing of stressed Plexiglass, and the lubricating oil leaves undesirable oily residues. Two of the best formulations included a pyrethrum synergist to economize in expensive pyrethrum extract, and contained 2 per cent. of the pyrethrum extract and 3 per cent. DDT. The synergists used were piperonyl butoxide and insecticide "264"; the latter consisted of N-(2 ethyl hexyl)bicyclo [2.2.1] 5-heptene-2,3-dicarboximide. The first formulation contained 1 per cent. Sovacide 544G, 8 per cent. insecticide "264" and 1 per cent. piperonyl butoxide, while the second contained 2 per cent. Sovacide 544G, 6 per cent. "264" and 2 per cent. piperonyl butoxide with toxic indices of 1.4 and 1.6 respectively, when the toxicity of G.382 at 3 gm. per 1,000 cu. ft. was taken as 1.0. However both piperonyl butoxide at concentrations of 1 or more per cent. produced irritation of the mucous membrane of the throat and nose and therefore limited its use to disinsectization of aircraft in the absence of passengers. The first formulation also proved very effective against house-flies resistant to various halogenated hydrocarbons.

Allethrin when substituted for pyrethrum in the G.382 formulation gave no loss in effectiveness. The synergic effect of piperonyl butoxide and "264", however, was not as evident in formulations containing allethrin substituted for natural pyrethrum.

An aerosol containing 2 per cent. pyrethrum extract, 3 per cent. DDT, 4 per cent. of Lethane 384 (50 per cent. solution of beta butoxy beta'thiocyno diethyl ether in petroleum distillate), 4 per cent. Sovacide 544.G and 2 per cent. piperonyl butoxide proved most effective with a toxicity index of 1.9. Further investigations with Lethane 384 are warranted.

Thomas E. Fletcher

MOORE, S., TOCZYDLOWSKI, A. H. & SWEETMAN, H. L. **Fly Control Experiments in Massachusetts in 1950.** *J. Econom. Entom.* 1951, Oct., v. 44, No. 5, 731-3.

"The fly season of 1950 was an unusually long one, but the relative abundance of the flies was considerably less than during 1948 and 1949. Lindane vapor treatments gave somewhat better control in the barns than did lindane applied as a residual spray. Vaporized applications gave excellent control of houseflies in amounts of 1 gram or less per 20,000 cu. ft. per 24 hours. The volume of dispersed lindane necessary for effective control was dependent upon the relative air circulation. Nevertheless, effective fly control resulted in all barns with relatively small amounts of lindane. Vaporized lindane did not build up residual deposits as did spray applications with lindane, methoxy-chlor and DDT. Where cattle were retained in the barns and adjoining pens during the entire day, horn flies were eliminated by the vapor treatments. No deleterious effects from the continuous application of lindane vapor were evident.

"No apparent resistance of flies to any of these insecticides was noticed throughout the experiment."

DOWNES, J. A. **Two Cases of Myiasis on Board Ship, due to the Larvae of *Cordylobia anthropophaga*.** *Ann. Trop. Med. & Parasit.* 1951, Sept., v. 45, No. 2, 169-70.

Cordylobia anthropophaga, the African myiasis-producing "tumbu-fly", is fairly common at Freetown and other West African ports. The author, after referring briefly to the life-cycle of this fly, describes two cases of myiasis associated with the larva which were seen on a vessel 10 days out from Freetown during a voyage from Ceylon to Britain.

One patient was a child of 18 months, with a dozen typical "boils" on the chest and abdomen and one on an ear. The other was a man of 28 with three larvae in the thigh. The larvae were well grown and infection must have taken place at least a week previously. As the fly is unknown outside Africa, it is likely that the cases originated in Freetown (the vessel was 24 days out of Capetown). Apparently neither of the patients had been ashore at Freetown, where the ship was anchored some three-quarters of a mile off shore. It is suggested that eggs or young larvae of the fly may have been introduced in litter associated with fruit and other stores taken on board: the goods had presumably passed through warehouses infested with rats, which are the most frequent hosts of the larvae. It seems doubtful whether the adult flies would cross the extent of open water necessary to reach the ship. The only other record of the transference of this species to a ship seems to be that by HERMANS and VAN THIEL (*Acta Leidensia*, 1936, v. 10-11, 120).

H. J. O'D. Burke-Gaffney

MILLER, M. J. & LOCKHART, J. A. **Hypodermal Myiasis caused by Larvae of the Ox-Warble (*Hypoderma bovis*).** Reprinted from *Canadian Med. Ass. J.* 1950, v. 62, 592-4, 3 figs.

MAZZOTTI, L. Presencia del *Ornithodoros stageri* en México. [**Presence of *Ornithodoros stageri* in Mexico**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico, 1950, Dec., v. 11, Nos. 2, 3 & 4, 153-7, 2 figs.

HEISCH, R. B. *Argas boueti* **Roubaud and Colas-Belcour 1933, in the Northern Province of Kenya.** *East African Med. J.* 1951, Sept., v. 28, No. 9, 354, 2 figs. on pl.

Argasid ticks received by the author, in Nairobi, from Wajir in the Northern Province of Kenya were found to agree with the published description of *Argas boueti*. The ticks were collected in an underground concrete shelter, the adults from the walls and the larvae from bats.

This species closely resembles *Argas vespertilionis*, also found on bats, but its legs are much longer. Two illustrations of a female *A. boueti* are given.

This appears to be the first record of *A. boueti* since it was first described from specimens collected in the French Sudan.

H. J. O'D. Burke-Gaffney

AUDY, J. R. & TRAUB, R. *Trombicula sylvestris* **sp. nov. (Acarina, Trombiculidae) from Malaya.** Reprinted from *Bull. Raffles Museum*. Singapore, 1950, Dec., No. 23, 325-7, 4 figs. on 3 pls.

TRAVIS, B. V. & SMITH, A. L. **Tests with Repellents against the Stable Fly.** *J. Amer. Vet. Med. Ass.* 1951, Sept., v. 119, No. 894, 214-16.

"In laboratory and field tests with a number of repellents against the stable fly, *Stomoxys calcitrans* (L.), indalone, 2-phenylcyclohexanol, *p*-methoxyacetophenone, and the pinene ether of glycol showed outstanding effectiveness. Dimethyl phthalate, repellent 6-12, and oil of citronella were relatively ineffective. The addition of thickeners to repellent 6-12 or dimethyl phthalate did not extend the repellent time. When the flies were aggressive, the repellent time was shorter."

COLONIAL OFFICE. **Colonial Research 1950-1951. Colonial Insecticides, Fungicides and Herbicides Committee. Fourth Annual Report (1950-1951)** [HALL, W. J., Chairman] (pp. 171-99). Cmd. 8303. 243 pp. 1951, July. London : H.M. Stationery Office. [6s. 6d.]

The report is divided into three parts and two appendices. Part I deals with administrative matters, Part II outlines the work in progress and names those concerned in the researches, and Part III, which is abstracted below, gives an account of the results obtained.

Laboratory Investigations

The Colonial Insecticide Research Unit, Porton, continues to investigate factors influencing the efficiency of contact insecticides. The size of the particles of an insecticide laid down as a surface deposit is shown to be important. In experiments with DDT particles of less than 10 up to 60 microns, it is established that the median lethal dose for *Aedes aegypti* adults is less for small particles than for large particles ; the rate of action is inversely related to particle size ; large particles are more readily lost from the insects by mechanical detachment than are smaller particles.

As regards the type of surface on which the deposit is laid down it has been shown, first, that on a non-porous substance (glass) the particles of insecticide adhere more firmly than on a porous substance (plaster) and are consequently less easily transferred to an insect. There are, however, interesting observations on the efficiency of several insecticides when sprayed on mud blocks. DDT, gamma-BHC, aldrin, or dieldrin were sprayed in 10-20-micron particles at 25 mgm. insecticide per sq. ft. on mud blocks. All of these insecticides ceased to be visible on the surface within 5 days. The mud blocks treated with DDT or with dieldrin then ceased to be toxic to *Aedes aegypti*. But the blocks treated with gamma-BHC or with aldrin continued to kill the mosquitoes for some time. In the case of gamma-BHC, the blocks still killed 25 per cent. of the insects 8 weeks after the application. It was found that all these insecticides had penetrated into the top 0.1 in. of the mud blocks within the first 5 days. The continued effectiveness of gamma-BHC and of aldrin is attributed to their slow vaporization continuously from the mud with effective fumigant action on the test insects. This phenomenon was obtained with various formulations of the insecticides and with blocks made from soil from Uganda, Kenya, Jamaica, and England. These findings suggest a possible explanation for the conflicting results obtained with residual sprays under field conditions.

In other experiments, the order of diminishing toxicity in contact tests with *Aedes aegypti* was dieldrin, gamma-BHC, aldrin, DDT, and, in fumigant tests, effectiveness diminished in the order gamma-BHC, aldrin, dieldrin, DDT. Particle size is for all these insecticides inversely related to effectiveness either by contact or fumigant action. The persistence of a deposit is greater if particle size is large ; increasing temperatures increased volatilization of volatile

insecticides and decreased their persistence. The order of diminishing persistence at any particle size was DDT, dieldrin, gamma-BHC and aldrin.

Impregnated dusts (diatomite, stockalite kaolin, or other inert dust impregnated with DDT) deposited in aqueous suspensions gave increased effectiveness as the proportion of DDT to the inert vehicle increased (from 5 per cent. to 35 per cent.). Again, particle size of the impregnated carrier dust was inversely related to effectiveness against mosquitoes.

The median lethal doses of DDT and gamma-BHC for tsetse flies (*G. palpalis*) when applied externally to the thorax, are calculated to be 0.157 microgramme of DDT per fly, and 0.028 microgramme gamma-BHC per fly. These quantities are contained in a single drop of 155 microns and 160 microns, respectively, of 10 per cent. solutions in kerosene of the crude insecticides containing 80 per cent. pp' DDT or 13 per cent. of the gamma-isomer of BHC.

Work continues on the factors affecting "bloom" of insecticides on insecticidal resin surfaces. Extreme hardness of a resin prevents bloom; the size of crystals formed increases with the concentration of insecticide in the resin and with the violence of mechanical stimulation to which the surface is exposed. Active walking insects, such as *Musca*, induce a heavy bloom; a mosquito does not. Resins have maintained toxicity for two years.

There are brief notes on the problems under investigation at the Imperial College Field Station, Silwood Park, and at Rothamsted Experimental Station. The former institute is investigating the structure of tsetse fly and blowfly tarsi in relation to pick-up of insecticides; the latter is concerned with the fate of insecticidal deposits on vegetation.

Field Experiments

The Colonial Insecticide Research Unit, East Africa, has continued its field experiments on the application of contact insecticides, particularly DDT and gamma-BHC, against mosquitoes and malaria, tsetse fly and trypanosomiasis.

Tsetse fly and trypanosomiasis

(a) Beginning in September, 1950, 7 applications from fixed-wing aircraft of 0.25 lb. DDT per acre at 2-2½-week intervals were made against *G. morsitans*, *G. swynnertonii* and *G. pallidipes*, in 15 sq. miles of bush. Rapid reductions in the fly populations were obtained and low densities persisted until January, 1951. Observations continue.

(b) Experiments have been made to test the value against *G. palpalis* of spraying large volumes of low concentration emulsions of insecticides over lacustrine vegetation on Lake Victoria. The applications were made with a fire-pump from a small boat off-shore. Results were not promising.

(c) Ground applications of DDT suspensions to riverine bush to control *G. palpalis* have been very successful. This work was undertaken to check an outbreak of sleeping sickness about 20 miles from Kisumu, Kenya.

(d) Population studies on *G. morsitans* and *G. swynnertonii* in a small block of bush at Kikore, Tanganyika, are in progress preparatory to a test of the effect of the introduction of cattle treated with DDT or BHC on fly densities.

Mosquitoes and malaria

(a) East Africa.

Field experiments to assess the value of different formulations of DDT and of BHC in the control of mosquitoes and malaria when applied as residual deposits in houses are summarized as follows:—

Rural areas, Kasanje, Uganda

(i) The DDT treatments had little if any permanent effect on malaria after experiments extending over 4 years.

(ii) BHC treatments had reduced malaria incidence to nearly one-third of its original figure.

(iii) BHC applied at 3-month intervals appears to be the best insecticide to use.

Urban area, Mbale, Uganda

Three treatments of the houses at 6-month intervals with DDT wettable powders had no significant influence on malaria incidence in children or newborn infants. Better formulations of insecticides and new investigations to determine the necessary frequency of retreatment are required.

Larvicidal treatment from aircraft of extensive mosquito-breeding swamps near Dar-es-Salaam, Tanganyika

No results are yet available from experiments begun in March on the larvicidal value of spraying $4\frac{1}{2}$ sq. miles of marsh with 10 per cent. DDT high-spreading oil solution at 2 oz. DDT per acre in 8 fortnightly applications.

Reactions of A. gambiae and A. funestus to huts treated with DDT and BHC, at Taveta, Tanganyika

DDT is shown to have a definite irritant repellent action on anopheline mosquitoes. BHC has a fumigant action; an apparent fumigant action by DDT and by dieldrin may be a result of distribution of these insecticides as air-borne particles.

(b) Malaya.

The effects of residual treatments of houses with DDT, with BHC, and of drug treatment with proguanil, on malaria, are compared in experiments in 3 separate valleys each treated by one of these methods. A fourth untreated valley-community provided a control.

The results show improvements in the parasite and spleen rates in children examined 4 and 10 months after the beginning of the treatments.

(c) Mauritius.

Three residual treatments of houses have been completed; only DDT was used in the third application.

Percentage reductions in mosquitoes were 97.1 per cent. for *A. gambiae*, 99.9 per cent. for *A. funestus*, and 99.9 per cent. for *Aedes aegypti*. Spleen and parasite rates in children dropped from 34.8 per cent. and 9.5 per cent. respectively in 1948 to 2.8 per cent. and 0.36 per cent. by 1950. Infants born since the first treatment show, for those under 12 months of age, a parasite rate of 0.27 per cent. in 7,065 examined. The data provided also show improvements in hospital and dispensary records for malaria, total annual death rates, infant mortality, and malaria and total death rates in the epidemic month for malaria.

Appreciable numbers of *A. gambiae* still persist and anti-larval measures are being undertaken to deal with this problem.

Control of Simulium on the Nile at Jinja, Uganda

In January–February 1951, 7 applications at 3-day intervals were made from fixed-wing aircraft of a DDT oil solution to the vegetation on the banks and islands along about 5 miles of the Nile, near Jinja. Deposits were estimated at 20 mgm. DDT per sq. ft. of area. Average daily catches of *Simulium* adults dropped from 36 before spraying to 2 after the fifth spraying. This is a preliminary experiment to determine the possibility of effective treatment of the Nile for 40 miles northwards from Jinja.

Appendix I

This appendix, prepared by Mr. C. B. SYMES, O.B.E., Officer-in-Charge of Research, reviews the history of the Committee, its establishment of personnel at home and overseas, and its work completed or still in progress since its inception in 1947 up to 1950. It records in some detail what has been undertaken at home and abroad to promote the scientific usage and understanding of modern insecticides when applied against, particularly, malaria and trypanosomiasis and their vectors. It is an informative article. As a summary of much that already has been reviewed in this *Bulletin*, either in abstracts of original papers or of earlier annual reports of the Committee, it should prove valuable and helpful to those who have not been free to follow closely laboratory researches and field work of recent years on the scientific application of contact insecticides for the control of arthropod-borne diseases in the tropics.

Appendix II

A list of publications and reports.

D. S. Bertram

HOLWAY, R. T. **Recent Developments in the Chemical Control of Insects.** *Med. Technicians Bull. Suppl. to U.S. Armed Forces Med. J.* 1951, May-June, v. 2, No. 3, 93-105.

DOWNES, W. G., BORDAS, E. & NAVARRO, L. **Duration of Action of Residual DDT Deposits on Adobe Surfaces.** *Science.* 1951, Sept. 7, 259-62, 2 figs. [19 refs.]

Varying results are obtained by different workers in different countries on the effectiveness of DDT residual deposits against mosquitoes, and the authors review world-wide literature on the topic. Difference in species and difference in surface sprayed will account for some of these results. Soil, as sun-baked adobe bricks, or in other types of common tropical construction material, sprayed with DDT, loses its effectiveness in varying times depending on locality and hence on the soil's composition.

In Mexico, the authors have found some adobes where persistence of DDT activity remained for a period of years, and have investigated 4 types of soil. The types were firstly from Distrito Federal derived from lake-bottom loamy soil, secondly from Morelos, of sandy clay, thirdly a deltaic deposit from Guerrero, and lastly a red clay soil from Michoacan. DDT water wettable powder was sprayed on the bricks at a dosage of 200 mgm. DDT per sq.ft. and tested up to 3 years for residual action with *A. aztecus* and *A. albimanus*. Soil from the Distrito Federal allowed DDT to retain its residual action for 3 years, that from Morelos for a year or more, while the other 2 samples inactivated DDT in 3-6 months. The times taken for the soils to catalyse the breakdown of DDT at 130°C. showed the same relationship, *i.e.*, no reaction in 3 hours for the Distrito Federal soil, while 90 per cent. DDT was decomposed with the Michoacan soil. Evidence to date showed that the undecomposed residue of DDT remained active, thus indicating that a soil could be saturated and after the saturation point was reached undecomposed DDT remained and could accumulate with repeated spraying.

A number of chemical determinations were carried out upon the soil. These analyses revealed that soils which were the most effective in catalysing the dehydrochlorination of DDT were highest in Fe and Al. Alkalinity of soil was not a significant factor in the catalysis. Laboratory tests showed FeCl_3 to be a more effective catalyst than AlCl_3 . Therefore Fe in the soil plays a much more important rôle than Al in catalysing DDT decomposition, and results indicated that it is the readily available iron oxide fraction of the soil that catalyses the reaction.

Laboratory tests suggested that DDT activity remained for relatively long periods on whitewashed surfaces provided the whitewash was low in Fe content. Thus whitewashing mud surfaces first before spraying will provide a solution to the problem of loss of residual activity of DDT. The authors draw attention to the fact that DDT kerosene solutions applied to adobe will not only carry DDT in solution deeper into the adobe out of effective range as a contact insecticide, but will also place the DDT in much closer contact with the Fe in the adobe than when water suspensions of DDT are used.

The authors' demonstration of the marked variability in the activity of different soils in catalysing the decomposition of DDT may well help to explain some of the divergent reports on DDT action appearing in the literature, and they point out that this work may be of value in detoxification of DDT-poisoned soils by dilute FeCl_3 solution.

Thomas E. Fletcher

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

COLONIAL OFFICE. **Colonial Research 1950-1951. Colonial Medical Research Committee. Sixth Annual Report (1950-1951)** [HIMSWORTH, H. P., Chairman] (pp. 97-136). Cmd. 8303. 243 pp. 1951, July. London: H.M. Stationery Office. [6s. 6d.]

This report gives details of a large volume of medical research in various spheres financed by the Colonial Development and Welfare research funds. Two matters of general interest deserve notice: facilities are now provided for specialists from the United Kingdom to work in the laboratories of overseas research units; the whole research programme is being scrutinized with a view to reducing expenditure because the funds available for old and new projects until 1956 amount to £600,000 and existing schemes would require £595,000.

It is only possible here to mention briefly the results of some of the investigations reported.

Malaria

Control in rural areas has been studied in Malaya in four strictly comparable valleys. One remained untreated as a control while the others were treated respectively with DDT and BHC sprays, and weekly treatment of the population with proguanil. All these control measures proved effective within a year, proguanil producing a very rapid fall in the parasite rate. In sprayed areas parasite and spleen rates tended to be maintained by old infections. The incidence of proguanil-resistant *P. falciparum* infections rose considerably in 1950, probably owing to improper administration of the drug, but *P. vivax* resistance was not encountered. Single doses of 0.4 gm. camoquin and 0.15 gm. base of Resochin gave good results against both parasites.

DDT and BHC were found to be effective against Malayan mosquitoes for 22 to 23 weeks. Anophelines soon re-entered BHC-sprayed houses, but up to 16 weeks between 70 and 90 per cent. of these died within 48 hours.

In North Borneo *A. sundanicus* does not appear to be an important carrier, and *A. leucosphyrus* is now regarded as a complex of 6 members scattered throughout Asia, the Borneo species being *A. leucosphyrus balabacensis*. Kerosene repels the species and should not be used as a DDT solvent.

In Jamaica *A. albimanus* with a low infection rate can maintain a high malaria incidence. The frequency with which *A. albimanus*, *A. bellator* and *A. aquasalis* fed on people of different age-groups was directly correlated with age, babies being rarely bitten and adult males most frequently.

In Trinidad examination of the blood meals of *A. aquasalis* by precipitin sera showed that feeding on man does not occur when the man : ox+equine ratio is less than 10 : 1. Nectar feeding by both sexes was confirmed by chromatography, and it is believed that after swarming sugar is required to regain energy.

An investigation of the natural history of malaria in Nigerian infants was concluded. Among 138 babies examined periodically from birth infection rates in successive quarters were 3 per cent., 14 per cent. and 50 per cent. respectively and nearly 100 per cent. by the end of the first year. Weight curves in both infected and uninfected babies increased steadily up to the fifth month when they flattened out, this being more marked in the infected group. A critical examination of autopsy reports incriminated malaria as a cause of death in about 9 per cent. of infants dying in hospital, 13 per cent. in early childhood, 7.4 per cent. in the younger and 3.6 per cent. in the old school-age groups. The activity of three anti-malarial drugs was assessed on naturally infected school children; the most rapid effect was produced by chloroquine, the slowest by proguanil with which the relapse rate was highest, while mepacrine was intermediate. In the malaria eradication project at Ilaro, BHC water-dispersible powder at 10 mgm. of the gamma isomer per square foot achieved almost complete eradication of *A. gambiae* and *A. funestus*.

Helminthiasis

Investigation in Tanganyika suggests that filariasis in many people seems to affect health little and that, possibly because of lower microfilaria counts, the infection is not so serious as in other parts of the world where late complications occur. The African appears to tolerate much higher doses of hetrazan than other races and the number of circulating larvae of *W. bancrofti* is rapidly reduced, but those of *A. perstans* are not affected. In Malaya the drug rapidly clears larvae of *W. malayi* from the blood but has little effect on clinical filariasis and elephantiasis.

Work continues on loiasis in the Cameroons where one-third of 150 monkeys examined harboured a filarial infection indistinguishable from *L. loa*.

In an investigation of guinea-worm infection in Nigeria, *Cyclops* vectors were chiefly to be found in stagnant ponds, particularly those without floating algae. *Thermocyclops nigerianus* is the vector when the water supply is constantly present, *Cryptocyclops jenkinsae* when it dries up periodically.

Relapsing Fever

It has been demonstrated that the tick-borne disease in Kenya occurs mostly at altitudes of 4,100 to 4,700 feet. The temperature of the earth floor of huts varied inversely with altitude and directly with humidity. Within the range 3,000 to 4,700 feet tick prevalence increased with altitude.

Typhoid fever

Chloromycetin [chloramphenicol] controls the organisms rapidly but clinical improvement is delayed. This was thought in Malaya to be due to host reaction to degeneration products present when treatment started. Cortisone was given with chloromycetin to a group of cases and pyrexia only lasted 15 hours in those receiving 300 mgm. of cortisone daily.

Leprosy

In Nigeria the value of sulphone treatment has been confirmed; only 4 of 100 cases treated and discharged were found to have relapsed. None of the various proprietary preparations appeared superior to the others. Strong evidence was obtained that the activity of these drugs was due to the liberation

of DDS. Oral treatment twice weekly with DDS was given to 20,000 cases during 10 months with apparent success. A very gradual induction of treatment is essential, commencing with doses of 100 mgm. for the first few weeks and rising to 400 mgm. in the third month. The annual cost of this treatment is about 7 shillings per patient, the toxicity is low and the results are as good as with other sulphones.

Scrub typhus

In Malayan forest the common giant rats, *R. sabanus* and *R. mülleri*, are the probable hosts of the jungle enzoötic, but outside the forest heavy infestations with vector mites are found on *R. rattus*. The efficiency of trans-ovarial passage of infection in mites seems to be less than hitherto supposed and this, if confirmed, raises the importance of the animal host as a prime reservoir of infection. Terramycin has been found effective in the treatment of scrub typhus but less so than chloromycetin and aureomycin. Immunity against homologous strains of the disease appears to persist for several years, but only for a few months against heterologous strains. Since vaccines have proved disappointing and chloromycetin expensive in prophylaxis, the intradermal inoculation of an attenuated strain of *Rickettsia orientalis* is being tried; the induced disease is controlled by chloromycetin in 3 gm. doses at 4-day intervals for three weeks.

Virus diseases

The general immunity rate to yellow fever in over 1,000 sera from 16 species of East African monkeys was over 40 per cent., but it showed great variation even in contiguous areas. Work in West Africa on the scratch method of vaccination with the 17D strain has been satisfactorily concluded. A comparison of the protection given by this strain both by scratch and subcutaneous routes with that of the French neurotropic strain by scratch showed a higher percentage protected by the French strain than the others.

Physiology

An interesting account is given of investigations carried out in Uganda on the red cell counts of African hospital patients. This showed that higher economic status of the patient and greater frequency of meat-eating were associated with higher counts. A careful study was made of the serum proteins and their relationships on these patients, but this cannot be satisfactorily abstracted. A similar investigation was made in Fiji.

Hot-climate studies were continued in Nigeria and the need for better criteria of acclimatization is stressed.

Nutrition

The Nutrition Field Working Party in the Gambia is now renamed the Gambia Field Working Party, and it has become the responsibility of that Government. Work on the amounts and inter-relationships of the nutriment in Gambian soils and their limiting effect on crop production has shown that substantial progress in the application of the results obtained by the science of nutrition must await the solution by agricultural science of the problem of crop production in tropical areas of which Gambia is typical.

Miscellaneous

Research on the preparation of specific precipitin sera has been continued at the Lister Institute and a common antigen has been found in the serum proteins of all mammals.

The East African Medical Survey reports the results of a survey on an island in Lake Victoria. The parasite rates and degree of anaemia of 600 consecutive

hospital admissions were investigated, and it was found that statistically the hookworm load was not related to the distribution or severity of anaemia.

The Colonial Medical Research Committee report ends with a short and interesting summary of research work financed and carried out by the medical departments of colonial territories.

T. H. Davey

RHODESIA, SOUTHERN. Report on the Public Health for the Year 1950 [MORRIS, R. M., Secretary for Health, Medical Director and Chief Health Officer]. 57 pp., 1 folding coloured map. 1951. Salisbury: Rhodesian Printing and Publishing Co., Ltd.

In 1950 the Colony of Southern Rhodesia was accepted as an Associate Member of W.H.O., and the Director of Preventive Services, Dr. D. BLAIR, became a W.H.O. Consultant in Schistosomiasis, one of the main scourges of Africa. It is a land-locked territory in Central Africa lying between the Zambesi and Limpopo Rivers with an area of 150,333 square miles. The climate in relation to the valleys of these large, unnavigable rivers is hot and tropical, whereas the wide area of plateau country stretching from the south-west corner to the north-eastern boundary has a congenial climate at an altitude of 4,000–5,000 feet above sea-level; in consequence this plateau country has seen extensive European settlement. Rainfall is limited to the summer months, November to March. Accurate vital statistics are available for Europeans; there are 129,000 Europeans and about 2,000,000 Africans. The European birth rate, death rate and infant mortality rate are 26·3, 6·7 and 35 respectively; a full-scale sample census of Africans in 1948 revealed the following rates: 46·2, 18·1 and 131 respectively.

Mineral production includes gold, chrome, asbestos, coal and mica. Tobacco is an important export. The staple food crop for Africans is maize, and methods of improving pasture are being investigated to assist the cattle industry to supply the ever-increasing demand for meat.

A pilot scheme in the Mazoe valley has shown the value of residual insecticides in the control of malaria [this *Bulletin*, 1951, v. 48, 1073]; similar schemes are to be introduced in African Reserves where "there is an awakening to the fact that malaria is not an act of God". Some cases of blackwater fever in Africans have occurred.

Miracil D hydrochloride (Nilodin) was introduced as the standard treatment for infections by *Schistosoma haematobium*. Molluscicides are applied by trained teams, and this replaces the older method of voluntary application by landowners.

Tuberculosis gives every indication of becoming the main health problem of the country; in the African the type of disease is changing from the infantile non-fibrosing to a more chronic type in which acute symptoms are more easily controlled, but with infrequent success in rendering patients' sputum negative and therefore non-infectious. A new sanatorium for 100 Africans has been opened in an African Reserve.

Heavy European immigration and housing shortage have had an adverse effect on the incidence of pulmonary tuberculosis in Europeans. Smallpox was a constant anxiety to the health staff, an incidence of 52 per 100,000 Africans with a case mortality rate of 21·5 per cent., necessitating the performance of 957,582 vaccinations.

General hospital admissions of Europeans have increased by nearly 50 per cent. in five years; there are available 5·3 beds per 1,000 of the European population, an admission rate of 131 per 1,000 with an average stay of 9·8 days per patient. The admission rate of Africans to the hospitals of the African Medical Service is 118·3 per 1,000, a 10 per cent. increase in one year. [The comparative figure of available beds per 1,000 Africans is not quoted but appears

to be approximately 0.6 for general hospitals. There are also many beds in Government Native Clinics.] A system of 84 Government Clinics with in-patient accommodation is used extensively by Africans, as indicated by approximately 1,520 in-patients and 3,530 out-patients per clinic for 1950. The drain on finances available for medical purposes is becoming serious, and it is regretted that a larger proportion of the funds made available are not directed more to the prevention of disease. Health and Medical Services expenditure forms 8.7 per cent. of the total expenditure of the country from Revenue funds, or 13.9 shillings per head of the total population; of this 13.9 shillings, one-eighth (1.74 shillings per head) covers administration and public health, and 12.16 shillings are for medical care.

Subsidiary reports of the Research Laboratory, the Government Pathologist the Public Health Laboratories, the Schools' Medical Service and the Government Dental Service are included.

R. Ford Tredre

HOEPLI, R. **The Development of Parasitology in China from 1930 to 1950.**

Peking Nat. Hist. Bull. 1950-51, Dec.-Mar., v. 19, Pts. 2/3, 90-146.

[Numerous refs.]

The author, from the Peking Union Medical College, gives an exhaustive review of the development of parasitology in China during the last two decades. The very large amount of material covered in the review is a tribute to the author's industry as the numerous investigations themselves are a tribute to the increasingly widespread studies undertaken by Chinese workers, at a most difficult period and under the trying conditions of war and economic distress.

In 1930, the only centre of organized parasitological research was in the Peking Union Medical College and even that had been established for only 10 years at the time. There are now many centres all over the country with a large number of workers engaged in them, and these are discussed by the author in his opening chapters. He then outlines the various surveys carried out and discusses work under a number of different headings, with full reference to the relevant publications. These cover such subjects as spirochaete infections, protozoan and helminth infections, other rare infections, entomology, biology, therapeutics (with special reference to indigenous drugs), pathology and historical studies.

The amount of work undertaken is impressive and the range wide. The important significance of some of this work is made clear by the author who writes:—

“ Among the great variety of subjects which have been studied a few stand out in consequence of their interesting and important results. The epidemiology of malaria is foremost as by now the transmitters in various parts of China are sufficiently known to allow antimalaria work with good prospects of success. The discovery of the existence of canine leishmaniasis in different localities to an extent formerly not suspected, is of very great practical importance in view of the probable rôle of the dog as reservoir host. The description of the complete development of *Spirochaeta recurrentis* in the body louse is valuable for studies of relapsing fever. Concerning helminth diseases the epidemiology of schistosoma and hookworm infection has been considerably advanced by new observations. Studies of the life histories, intermediate hosts and epidemiology of *Clonorchis sinensis*, *Fasciolopsis buski* and *paragonimus* likewise produced many new and interesting facts. *Wuchereria malayi* infection has been shown to exist in China to a considerable extent. The histopathology of various parasitic infections especially of leishmaniasis has been studied in great detail; the discovery that the Chinese hamster, *Cricetulus griseus*, is a very suitable

animal for experimental leishmaniasis greatly advanced these studies. The results of this kind of work will be found valuable and useful for comparative studies of similar infections in other countries."

The review concludes with 4½ pages of references arranged alphabetically in subjects and a bibliography of no less than 28 pages—a remarkable undertaking for which the author is to be congratulated. *H. J. O'D. Burke-Gaffney*

GIBSON, J. M. **Physician to the World. The Life of General William C. Gorgas.** pp. ix+315, 6 pls. 1950. Durham : Duke University Press, North Carolina. [34s.]

BOOK REVIEW

RAINA, B. L. **Introduction to Malaria Problem in India.** With an Introduction by Jivraj N. MEHTA. pp. ix+129, 4 figs. on 4 pls., 1 coloured frontispiece, 2 plans, 1 chart & 1 map. 1951. Bombay : New Book Co. Ltd., 188-90, Hornby Road, Fort. [Rs. 7/12/-]

This monograph is an elaboration of a thesis submitted by the author to the University of Bombay in 1944, and contains 10 chapters, the first of which is historical. The second deals with the life cycle of each of the 4 species of human malaria parasite, the erythrocytic stages of which are depicted in a coloured frontispiece taken from Knowles's *Introduction to Medical Protozoology*. This is followed by notes on the bionomics of the most important mosquito vectors of India and a brief outline of some of the epidemiological features of malaria in that country. There is a chapter on chemotherapy and some reflections on the progress achieved in recent years in the study and control of the disease. Stress is rightly laid on the paramount importance of an adequately staffed permanent malaria organization for each state, working in collaboration with the Malaria Institute of India, which has its headquarters in Delhi.

One-third of the book is made up of appendices. The first contains extracts from the Report of the Health Survey and Development Committee of 1946, generally known as the Bhole Committee Report. In this details are given of a comprehensive scheme put forward by the Director, Malaria Institute of India, for the control of malaria in every province in the country, much of which is now in operation. Other appendices contain examples of anti-mosquito legislation in force in the United States, Malaya and Bombay.

Lt.-Col. Raina's book contains no original observations and has no pretensions to be regarded as a textbook on malaria, a function more adequately fulfilled by the 13 bulletins issued by the Malaria Institute of India, listed in the final appendix. As an introduction to the malaria problem in India, it fulfils its purpose admirably.

G. Covell

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